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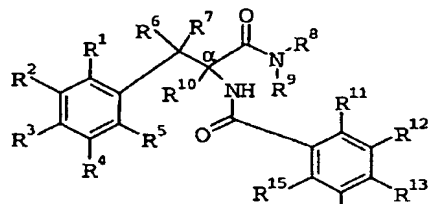
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(54) DERIVES DE PHENYLALANINE EN TANT QU'HERBICIDES
(54) PHENYLALANINE DERIVATIVES AS HERBICIDES

(57) The invention relates to phenylalanine derivatives of formula (I), wherein the radicals have the meaning cited in the description. The invention also relates to the utilization of said compounds as herbicides and/or for regulating plant growth.



(I)



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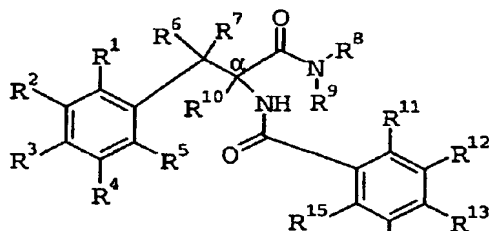
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(54) Title: PHENYLALANINE DERIVATIVES AS HERBICIDES



(I)

(57) Abrégé/Abstract:

The invention relates to phenylalanine derivatives of formula (I), wherein the radicals have the meaning cited in the description. The invention also relates to the utilization of said compounds as herbicides and/or for regulating plant growth.

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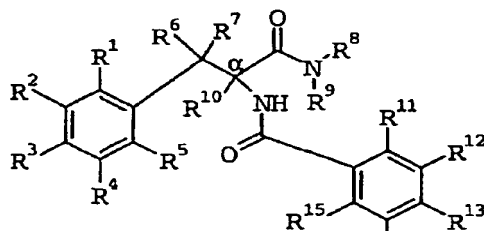
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(54) Title: PHENYLALANINE DERIVATIVES AS HERBICIDES

(54) Bezeichnung: PHENYLALANINDERIVATE ALS HERBIZIDE



(I)

(57) Abstract: The invention relates to phenylalanine derivatives of formula (I), wherein the radicals have the meaning cited in the description. The invention also relates to the utilization of said compounds as herbicides and/or for regulating plant growth.

(57) Zusammenfassung: Die vorliegende Erfindung betrifft Phenylalaninderivate der Formel (I), wobei die Reste die in der Beschreibung angegebene Bedeutung haben, sowie die

Verwendung dieser Verbindungen als Herbizide und/oder zur Regulation des Wachstums von Pflanzen.

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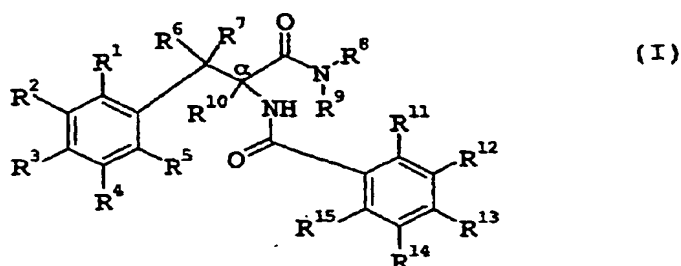
Phenylalanine derivatives as herbicides

The present invention relates to phenylalanine derivatives of the
5 formula

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10

15



in which

- R^1 , R^2 , R^4 , R^5 , R^{13} and R^{15} independently of one another are
 20 hydrogen, halogen, hydroxyl, mercapto, nitro, cyano,
 C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkoxy,
 C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-alkylthio,
 C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl,
 C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl,
 25 C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl,
 C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl,
 C₂-C₆-haloalkynyl, C₁-C₆-haloalkoxy, C₃-C₆-haloalkenyloxy,
 C₃-C₆-haloalkynyloxy, C₁-C₆-haloalkylthio,
 C₃-C₆-haloalkenylthio, C₃-C₆-haloalkynylthio,
 30 C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl,
 C₃-C₆-haloalkynylsulfinyl, C₁-C₆-haloalkylsulfonyl,
 C₃-C₆-haloalkenylsulfonyl, C₃-C₆-haloalkynylsulfonyl,
 formyl, C₁-C₆-alkylcarbonyloxy,
 C₁-C₆-alkoxy-C₁-C₄-alkyl, C₃-C₆-alkenyloxy-C₁-C₄-alkyl,
 35 C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl,
 C₃-C₆-alkenylthio-C₁-C₄-alkyl, C₃-C₄-alkynylthio-C₁-C₄-alkyl,
 C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl,
 C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl,
 C₁-C₆-alkoxycarbonyl-C₁-C₄-alkyl,
 40 C₁-C₆-alkoxy-C₁-C₄-alkoxy, C₃-C₆-alkenyloxy-C₁-C₄-alkoxy,
 C₃-C₄-alkynyloxy-C₁-C₄-alkoxy, C₁-C₆-alkylthio-C₁-C₄-alkoxy,
 C₃-C₆-alkenylthio-C₁-C₄-alkoxy, C₃-C₆-alkynylthio-C₁-C₄-alkoxy,
 C₁-C₆-alkylcarbonyl-C₁-C₄-alkoxy,
 C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkoxy,
 45 C₁-C₆-alkoxycarbonyl-C₁-C₄-alkoxy or CO-R¹⁶;

2

- R³ is hydrogen, halogen, mercapto, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl, C₂-C₆-haloalkynyl, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₃-C₆-haloalkynylthio, C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₃-C₆-haloalkynylsulfinyl, C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl, C₃-C₆-haloalkynylsulfonyl, C₁-C₆-alkoxy-C₁-C₄-alkyl, C₃-C₆-alkenyloxy-C₁-C₄-alkyl, C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl, C₃-C₆-alkenylthio-C₁-C₄-alkyl, C₃-C₆-alkynylthio-C₁-C₄-alkyl, C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl, C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl, C₁-C₆-alkyloxycarbonyl-C₁-C₄-alkyl or CO-R¹⁶;
- R⁶ is hydrogen, C₂-C₆-alkenyl, C₂-C₆-alkynyl or C₁-C₆-alkyl;
- 20 R⁷ is hydrogen, halogen, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl or C₂-C₆-haloalkynyl;
- R⁸ is methyl, ethyl, C₁-C₆-alkoxy or hydroxyl;
- 25 R⁹ is hydrogen or C₁-C₆-alkyl;
- R¹⁰ is hydrogen, C₁-C₆-alkyl, C₁-C₆-alkoxycarbonyl or C₁-C₆-haloalkoxycarbonyl;
- 30 R¹¹ is halogen, mercapto, nitro, cyano, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl, C₂-C₆-haloalkynyl, C₁-C₆-haloalkoxy, C₃-C₆-haloalkenyloxy, C₃-C₆-haloalkynyloxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₃-C₆-haloalkynylthio, C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₃-C₆-haloalkynylsulfinyl, C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl, C₃-C₆-haloalkynylsulfonyl, formyl, C₁-C₆-alkylcarbonyloxy, C₁-C₆-alkoxy-C₁-C₄-alkyl, C₂-C₆-alkenyloxy-C₁-C₄-alkyl, C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl, C₂-C₆-alkenylthio-C₁-C₄-alkyl, C₃-C₄-alkynylthio-C₁-C₄-alkyl,
- 45

3

- C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl,
 C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl,
 C₁-C₆-alkyloxy carbonyl-C₁-C₄-alkyl,
 C₁-C₆-alkoxy-C₁-C₄-alkoxy, C₃-C₆-alkenyloxy-C₁-C₄-alkoxy,
 5 C₃-C₄-alkynyloxy-C₁-C₄-alkoxy, C₁-C₆-alkylthio-C₁-C₄-alkoxy,
 C₃-C₆-alkenylthio-C₁-C₄-alkoxy, C₃-C₆-alkynylthio-C₁-C₄-alkoxy,
 C₁-C₆-alkylcarbonyl-C₁-C₄-alkoxy,
 C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkoxy,
 C₁-C₆-alkyloxy carbonyl-C₁-C₄-alkoxy or CO-R¹⁶;
 10
- R¹² and R¹⁴ independently of one another are hydrogen, halogen,
 hydroxyl, mercapto, cyano, C₁-C₆-alkyl, C₂-C₆-alkenyl,
 C₂-C₆-alkynyl, C₁-C₆-alkoxy, C₃-C₆-alkenyloxy,
 C₃-C₆-alkynyloxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio,
 15 C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl,
 C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl,
 C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl,
 C₃-C₆-haloalkenyl, C₂-C₆-haloalkynyl, C₁-C₆-haloalkoxy,
 C₃-C₆-haloalkenyloxy, C₃-C₆-haloalkynyloxy,
 20 C₁-C₆-haloalkylthio, C₂-C₆-haloalkenylthio,
 C₃-C₆-haloalkynylthio, C₁-C₆-haloalkylsulfinyl,
 C₃-C₆-haloalkenylsulfinyl, C₃-C₆-haloalkynylsulfinyl,
 C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl,
 C₃-C₆-haloalkynylsulfonyl,
 25 formyl, C₁-C₆-alkylcarbonyloxy,
 C₁-C₆-alkoxy-C₁-C₄-alkyl, C₃-C₆-alkenyloxy-C₁-C₄-alkyl,
 C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl,
 C₃-C₆-alkenylthio-C₁-C₄-alkyl, C₃-C₄-alkynylthio-C₁-C₄-alkyl,
 C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl,
 30 C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl,
 C₁-C₆-alkyloxy carbonyl-C₁-C₄-alkyl,
 C₁-C₆-alkoxy-C₁-C₄-alkoxy, C₃-C₆-alkenyloxy-C₁-C₄-alkoxy,
 C₃-C₄-alkynyloxy-C₁-C₄-alkoxy, C₁-C₆-alkylthio-C₁-C₄-alkoxy,
 C₃-C₆-alkenylthio-C₁-C₄-alkoxy, C₃-C₆-alkynylthio-C₁-C₄-alkoxy,
 35 C₁-C₆-alkylcarbonyl-C₁-C₄-alkoxy,
 C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkoxy,
 C₁-C₆-alkyloxy carbonyl-C₁-C₄-alkoxy or CO-R¹⁶; and
- R¹⁶ is hydrogen, hydroxyl, C₁-C₆-alkyl, C₂-C₆-alkenyl,
 40 C₂-C₆-alkynyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl,
 C₂-C₆-haloalkynyl, C₁-C₆-alkoxy, C₃-C₆-alkenyloxy,
 C₃-C₆-alkynyloxy, C₁-C₆-haloalkoxy, C₁-C₆-alkylamino or
 di(C₁-C₆-alkyl)amino;
- 45 or

4

- R⁷ together with R¹⁰ forms a C₃-C₄-alkylene or -alkenylene chain, where the C₃-C₄-alkylene or -alkenylene chain may carry 1-3 substituents from the group consisting of halogen, nitro or cyano and/or one carbon atom of the C₃-C₄-alkylene chain may be replaced by a heteroatom selected from the group consisting of oxygen, sulfur and nitrogen and/or by a carbonyl group,

and the agriculturally useful salts of the compounds I.

10

Moreover, the invention relates to

- the use of the compounds I as herbicides,
- 15 • herbicidal compositions which comprise the compounds I as active substances,
- processes for preparing the compounds I and for preparing herbicidal compositions using the compounds I, and also
- 20 • methods for controlling undesirable vegetation using the compounds I and/or
- for controlling the growth of plants,
- 25 • compositions for regulating the growth of plants, which compositions comprise the compounds I as active substances,
- 30 • processes for preparing compositions for regulating the growth of plants using the compounds I, and also
- methods for regulating the growth of plants using the compounds I.

35

Numerous amino acid derivatives are disclosed in the literature; WO 01/21584, for example, describes tyrosine derivatives which can be used for treating chronic inflammatory conditions.

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EP-A 805 147 discloses amino acid derivatives which can be used as calcium channel modulators.

45

WO 97/19908 describes phenylalanine derivatives whose phenyl ring is preferably substituted by fluorine and which can be used as fungicides.

5

4JP-A 02088549 teaches derivatives of amino acids which are preferably derived from proline, serine or threonine. The compounds described have antithrombotic action.

- 5 WO 97/05865 discloses amino acid derivatives which are preferably SO₂-substituted at the amino group group and are used as C-proteinase inhibitors.

DE-A 33 326 333 discloses carboxylic acid derivatives suitable
10 for preparing medicaments.

JP 3294-253-A teaches amino acid derivatives as inhibitors of cholecystokinin and gastrin receptors.

- 15 It is an object of the present invention to provide herbicidally active compounds.

The object also extends to the provision of compounds suitable for regulating the growth of plants.

- 20 We have found that this object is achieved by providing the phenylalanine derivatives of the formula I defined at the outset.

Furthermore, it has been found that the compounds I are also suitable for regulating the growth of plants. In this respect, we

- 25 have found compositions for regulating the growth of plants, processes for preparing these compositions and methods for regulating the growth of plants using the compounds I.

Owing to the asymmetrically substituted α -carbon, these compounds
30 are present either as racemates, enantiomer mixtures or as pure enantiomers and may, if they carry chiral substituents on the α -carbon or have further centers of chirality, also be present as diastereomer mixtures. Furthermore, depending on the substitution pattern, the compounds I can also be present as diastereomer

- 35 mixtures. Preference is given to compounds of the formula I in which the α -carbon has the S configuration. Hereinbelow, these compounds are also referred to as S enantiomers.

Suitable agriculturally useful salts are especially the salts of
40 those cations or the acid addition salts of those acids whose cations and anions, respectively, have no adverse effect on the herbicidal action of the compounds I. Thus, suitable cations are in particular the ions of the alkali metals, preferably sodium and potassium, of the alkaline earth metals, preferably calcium,
45 magnesium and barium, and of the transition metals, preferably manganese, copper, zinc and iron, and also the ammonium ion which, if desired, may carry one to four C₁-C₄-alkyl substituents

6

and/or one phenyl or benzyl substituent, preferably diisopropylammonium, tetramethylammonium, tetrabutylammonium, trimethylbenzylammonium, furthermore phosphonium ions, sulfonium ions, preferably tri(C₁-C₄-alkyl)sulfonium, and sulfoxonium ions, 5 preferably tri(C₁-C₄-alkyl)sulfoxonium.

Anions of useful acid addition salts are primarily chloride, bromide, fluoride, hydrogen sulfate, sulfate, dihydrogen phosphate, hydrogen phosphate, phosphate, nitrate, bicarbonate, 10 carbonate, hexafluorosilicate, hexafluorophosphate, benzoate, and also the anions of C₁-C₄-alkanoic acids, preferably formate, acetate, propionate and butyrate. They can be formed by reacting I with an acid of the corresponding anion, preferably of hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric 15 acid or nitric acid.

The organic moieties mentioned in the definition of the substituents R¹ to R¹⁵ are — like the term halogen — collective terms for individual enumerations of the individual group 20 members. All hydrocarbon chains, i.e. all alkyl, alkenyl, alkynyl, haloalkyl, haloalkenyl, haloalkynyl moieties, can be straight-chain or branched. Halogenated substituents preferably carry one to five identical or different halogen atoms. The term halogen denotes in each case fluorine, chlorine, bromine or 25 iodine.

Examples of meanings are:

- halogen is fluorine, chlorine or bromine; 30
- C₁-C₄-alkyl is methyl, ethyl, n-propyl, 1-methylethyl, n-butyl, 1-methylpropyl, 2-methylpropyl or 1,1-dimethylethyl;
- C₁-C₆-alkyl is a C₁-C₄-alkyl radical as mentioned above or, for 35 example, n-pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 2,2-dimethylpropyl, 1-ethylpropyl, n-hexyl, 1,1-dimethylpropyl, 1,2-dimethylpropyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1,1-dimethylbutyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 2,2-dimethylbutyl, 40 2,3-dimethylbutyl, 3,3-dimethylbutyl, 1-ethylbutyl, 2-ethylbutyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl, 1-ethyl-1-methylpropyl or 1-ethyl-2-methylpropyl;
- C₃-C₄-alkenyl is a mono- or diethylenically unsaturated radical 45 having 3 or 4 carbon atoms, such as prop-1-en-1-yl, allyl, 1-methylethenyl, but-1-en-1-yl, but-1-en-2-yl, but-1-en-3-yl,

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but-2-en-1-yl, 1-methylprop-1-en-1-yl, 2-methylprop-1-en-1-yl,
1-methylprop-2-en-1-yl or 2-methylprop-2-en-1-yl;

- C₅-C₆-alkenyl is a C₃-C₄-alkenyl radical as mentioned above or
 5 is a mono- or polyethylenically unsaturated radical having 5 or
 6 carbon atoms, such as, for example, n-penten-1-yl,
 n-penten-2-yl, n-penten-3-yl, n-penten-4-yl,
 1-methylbut-1-en-1-yl, 2-methylbut-1-en-1-yl,
 3-methylbut-1-en-1-yl, 1-methylbut-2-en-1-yl,
 10 2-methylbut-2-en-1-yl, 3-methylbut-2-en-1-yl,
 1-methylbut-3-en-1-yl, 2-methylbut-3-en-1-yl,
 3-methylbut-3-en-1-yl, 1,1-dimethylprop-2-en-1-yl,
 1,2-dimethyl-prop-1-en-1-yl, 1,2-dimethylprop-2-en-1-yl,
 1-ethylprop-1-en-2-yl, 1-ethylprop-2-en-1-yl, n-hex-1-en-1-yl,
 15 n-hex-2-en-1-yl, n-hex-3-en-1-yl, n-hex-4-en-1-yl,
 n-hex-5-en-1-yl, 1-methylpent-1-en-1-yl,
 2-methylpent-1-en-1-yl, 3-methylpent-1-en-1-yl,
 4-methylpent-1-en-1-yl, 1-methylpent-2-en-1-yl,
 2-methylpent-2-en-1-yl, 3-methylpent-2-en-1-yl,
 20 4-methylpent-2-en-1-yl, 1-methylpent-3-en-1-yl,
 2-methylpent-3-en-1-yl, 3-methylpent-3-en-1-yl,
 4-methylpent-3-en-1-yl, 1-methylpent-4-en-1-yl,
 2-methylpent-4-en-1-yl, 3-methylpent-4-en-1-yl,
 4-methylpent-4-en-1-yl, 1,1-dimethylbut-2-en-1-yl,
 1,1-dimethylbut-3-en-1-yl, 1,2-dimethylbut-1-en-1-yl,
 25 1,2-dimethylbut-2-en-1-yl, 1,2-dimethylbut-3-en-1-yl,
 1,3-dimethylbut-1-en-1-yl, 1,3-dimethyl-but-2-en-1-yl,
 1,3-dimethylbut-3-en-1-yl, 2,2-dimethylbut-3-en-1-yl,
 2,3-dimethylbut-1-en-1-yl, 2,3-dimethylbut-2-en-1-yl,
 2,3-dimethylbut-3-en-1-yl, 3,3-dimethylbut-1-en-1-yl,
 30 3,3-dimethylbut-2-en-1-yl, 1-ethylbut-1-en-1-yl,
 1-ethylbut-2-en-1-yl, 1-ethylbut-3-en-1-yl,
 2-ethylbut-1-en-1-yl, 2-ethylbut-2-en-1-yl,
 2-ethylbut-3-en-1-yl, 1,1,2-trimethylprop-2-en-1-yl,
 1-ethyl-1-methylprop-2-en-1-yl, 1-ethyl-2-methylprop-1-en-1-yl
 35 or 1-ethyl-2-methylprop-2-en-1-yl;
- C₂-C₆-alkenyl is a C₃-C₆-alenylyl radical as mentioned above or
 ethenyl;
- 40 - C₂-C₄-alkenyl is a C₃-C₄-alenylyl radical as mentioned above or
 ethenyl;
- C₂-C₄-alkynyl is: ethynyl, prop-1-yn-1-yl, prop-2-yn-1-yl,
 n-but-1-yn-1-yl, n-but-1-yn-3-yl, n-but-1-yn-4-yl or
 45 n-but-2-yn-1-yl;

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- C₃-C₆-alkynyl is a C₂-C₄-alkynyl radical as mentioned above or
n-pent-1-yn-1-yl, n-pent-1-yn-3-yl, n-pent-1-yn-4-yl,
n-pent-1-yn-5-yl, n-pent-2-yn-1-yl, n-pent-2-yn-4-yl,
n-pent-2-yn-5-yl, 3-methylbut-1-yn-3-yl, 3-methylbut-1-yn-4-yl,
5 n-hex-1-yn-1-yl, n-hex-1-yn-3-yl, n-hex-1-yn-4-yl,
n-hex-1-yn-5-yl, n-hex-1-yn-6-yl, n-hex-2-yn-1-yl,
n-hex-2-yn-4-yl, n-hex-2-yn-5-yl, n-hex-2-yn-6-yl,
n-hex-3-yn-1-yl, n-hex-3-yn-2-yl, 3-methylpent-1-yn-1-yl,
3-methylpent-1-yn-3-yl, 3-methylpent-1-yn-4-yl,
10 3-methylpent-1-yn-5-yl, 4-methylpent-1-yn-1-yl,
4-methylpent-2-yn-4-yl and 4-methylpent-2-yn-5-yl;
- C₂-C₆-alkynyl is a C₃-C₆-alkynyl radical as mentioned above
or ethynyl;
- 15 - C₃-C₆-alkenyloxy is a C₃-C₆-alkenyl radical as mentioned above
which is attached to the skeleton via an oxygen atom (-O-);
- C₁-C₄-alkoxy is a C₁-C₄-alkyl radical as mentioned above which
is attached to the skeleton via an oxygen atom (-O-);
20
- C₁-C₆-alkoxy is a C₁-C₆-alkyl radical as mentioned above which
is attached to the skeleton via an oxygen atom (-O-);
- 25 - C₃-C₆-alkenyloxy is a C₃-C₆-alkenyl radical as mentioned above
which is attached to the skeleton via an oxygen atom (-O-);
- C₃-C₆-alkynyloxy is a C₃-C₆-alkynyl radical as mentioned above
which is attached to the skeleton via an oxygen atom (-O-);
- 30 - C₁-C₆-alkylthio is a C₁-C₆-alkyl radical as mentioned above
which is attached to the skeleton via a sulfur atom (-S-);
- C₃-C₆-alkenylthio is a C₃-C₆-alkenyl radical as mentioned above
which is attached to the skeleton via a sulfur atom (-S-);
35
- C₃-C₆-alkynylthio is a C₃-C₆-alkynyl radical as mentioned above
which is attached to the skeleton via a sulfur atom (-S-);
- C₁-C₆-alkylsulfinyl is a C₁-C₆-alkyl radical as mentioned above
which is attached to the skeleton via a sulfinyl group (-SO-);
40
- C₃-C₆-alkenylsulfinyl is a C₃-C₆-alkenyl radical as mentioned
above which is attached to the skeleton via a sulfinyl group
(-SO-);
45

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- C₃-C₆-alkynylsulfinyl is a C₃-C₆-alkynyl radical as mentioned above which is attached to the skeleton via a sulfinyl group (-SO-);
- 5 - C₁-C₆-alkylsulfonyl is a C₁-C₆-alkyl radical as mentioned above which is attached to the skeleton via a sulfonyl group (-SO₂-);
- C₃-C₆-alkenylsulfonyl is a C₃-C₆-alkenyl radical as mentioned above which is attached to the skeleton via a sulfonyl group (-SO₂-);
- 10 - C₃-C₆-alkynylsulfonyl is a C₃-C₆-alkynyl radical as mentioned above which is attached to the skeleton via a sulfonyl group (-SO₂-);
- 15 - C₁-C₄-haloalkyl is a C₁-C₄-alkyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e., for example, chloromethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorfluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl, 2-fluoroethyl, 2-chloroethyl, 2-bromoethyl, 2-iodoethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, 2-chloro-2-fluoroethyl, 2-chloro-2,2-difluoroethyl, 2,2-dichloro-2-fluoroethyl, 2,2,2-trichloroethyl, pentafluoroethyl, 2-fluoropropyl, 25 3-fluoropropyl, 2,2-difluoropropyl, 2,3-difluoropropyl, 2-chloropropyl, 3-chloropropyl, 2,3-dichloropropyl, 2-bromopropyl, 3-bromopropyl, 3,3,3-trifluoropropyl, 3,3,3-trichloropropyl, 2,2,3,3,3-pentafluoropropyl, heptafluoropropyl, 1-(fluoromethyl)-2-fluoroethyl, 30 1-(chloromethyl)-2-chloroethyl, 1-(bromomethyl)-2-bromoethyl, 4-fluorobutyl, 4-chlorobutyl, 4-bromobutyl or nonafluorobutyl, in particular chloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, 2-fluoroethyl, 2-chloroethyl or 2,2,2-trifluoroethyl;
- 35 - C₁-C₆-haloalkyl is a C₁-C₆-alkyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e. for example, one of the radicals mentioned under C₁-C₄-haloalkyl or 5-fluoro-1-pentyl, 40 5-chloro-1-pentyl, 5-bromo-1-pentyl, 5-iodo-1-pentyl, 5,5,5-trichloro-1-pentyl, undecafluoropentyl, 6-fluoro-1-hexyl, 6-chloro-1-hexyl, 6-bromo-1-hexyl, 6-iodo-1-hexyl, 6,6,6-trichloro-1-hexyl or dodecafluorohexyl;

10

- C₂-C₆-haloalkenyl is a C₂-C₆-alkenyl radical as mentioned above in which some or all of the hydrogen atoms may be replaced by halogen atoms as mentioned above, in particular by fluorine, chlorine and bromine;
- 5 - C₂-C₆-haloalkynyl is a C₂-C₆-alkynyl radical as mentioned above in which some or all of the hydrogen atoms may be replaced by halogen atoms as mentioned above, in particular by fluorine, chlorine and bromine;
- 10 - C₁-C₆-haloalkoxy is a C₁-C₆-haloalkyl radical as mentioned above which is attached to the skeleton via an oxygen atom (-O-);
- 15 - C₃-C₆-haloalkenyloxy is a C₃-C₆-alkenyloxy radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine;
- 20 - C₃-C₆-haloalkynyloxy is a C₃-C₆-alkynyloxy radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine;
- 25 - C₁-C₆-haloalkylthio is a C₁-C₆-haloalkyl radical as mentioned above which is attached to the skeleton via a sulfur atom (-S-);
- 30 - C₃-C₆-haloalkenylthio is a C₃-C₆-haloalkenyl radical as mentioned above which is attached to the skeleton via a sulfur atom (-S-);
- 35 - C₃-C₆-haloalkynylthio is a C₃-C₆-haloalkynyl radical as mentioned above which is attached to the skeleton via a sulfur atom (-S-);
- 40 - C₁-C₆-haloalkylsulfinyl is a C₁-C₆-haloalkyl radical as mentioned above which is attached to the skeleton via a sulfinyl group (-SO-);
- 45 - C₃-C₆-haloalkenylsulfinyl is a C₃-C₆-haloalkenyl radical as mentioned above which is attached to the skeleton via a sulfinyl group (-SO-);
- 40 - C₃-C₆-haloalkynylsulfinyl is a C₃-C₆-haloalkynyl radical as mentioned above which is attached to the skeleton via a sulfinyl group (-SO-);

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- C₁-C₆-haloalkylsulfonyl is a C₁-C₆-haloalkyl radical as mentioned above which is attached to the skeleton via a sulfonyl group (-SO₂-);
- 5 - C₃-C₆-haloalkenylsulfonyl is a C₃-C₆-haloalkenyl radical as mentioned above which is attached to the skeleton via a sulfonyl group (-SO₂-);
- C₃-C₆-haloalkynylsulfonyl is a C₃-C₆-haloalkynyl radical as mentioned above which is attached to the skeleton via a sulfonyl group (-SO₂-);
- 10 - C₁-C₆-alkylcarbonyloxy is a C₁-C₆-alkyl radical which is attached to the skeleton via a carbonyloxy group (-C(O)-O-) via the oxygen;
- 15 - C₁-C₆-alkoxy-C₁-C₄-alkyl is a C₁-C₄-alkyl radical as mentioned above which is substituted by a C₁-C₆-alkoxy radical as mentioned above, for example methoxymethyl, ethoxymethyl, n-propoxymethyl, i-propoxymethyl, n-butoxymethyl, (1-methylpropoxy)methyl, (2-methylpropoxy)methyl, t-butoxymethyl, 2-(methoxy)ethyl, 2-(ethoxy)ethyl, 2-(n-propoxy)ethyl, 2-(1-methylethoxy)ethyl, 2-(n-butoxy)ethyl, 2-(1-methylpropoxy)ethyl, 2-(2-methylpropoxy)ethyl, 25 2-(1,1-dimethylethoxy)ethyl, 2-(methoxy)propyl, 2-(ethoxy)propyl, 2-(n-propoxy)propyl, 2-(1-methylethoxy)propyl, 2-(n-butoxy)propyl, 2-(1-methylpropoxy)propyl, 2-(2-methylpropoxy)propyl, 2-(1,1-dimethylethoxy)propyl, 3-(methoxy)propyl, 3-(ethoxy)propyl, 3-(n-propoxy)propyl, 3-(1-methylethoxy)propyl, 30 3-(n-butoxy)propyl, 3-(1-methylpropoxy)propyl, 3-(2-methylpropoxy)propyl, 3-(1,1-dimethylethoxy)propyl, 2-(methoxy)butyl, 2-(ethoxy)butyl, 2-(n-propoxy)butyl, 2-(1-methylethoxy)butyl, 2-(n-butoxy)butyl, 2-(1-methylpropoxy)butyl, 2-(2-methylpropoxy)butyl, 35 2-(1,1-dimethylethoxy)butyl, 3-(methoxy)butyl, 3-(ethoxy)butyl, 3-(n-propoxy)butyl, 3-(1-methylethoxy)butyl, 3-(n-butoxy)butyl, 3-(1-methylpropoxy)butyl, 3-(2-methylpropoxy)butyl, 3-(1,1-dimethylethoxy)butyl, 4-(methoxy)butyl, 4-(ethoxy)butyl, 4-(n-propoxy)butyl, 4-(1-methylethoxy)butyl, 4-(n-butoxy)butyl, 40 4-(1-methylpropoxy)butyl, 4-(2-methylpropoxy)butyl or 4-(1,1-dimethylethoxy)butyl;
- C₃-C₆-alkenyloxy-C₁-C₄-alkyl is a C₁-C₄-alkyl radical as mentioned above which is substituted by a C₃-C₆-alkenyloxy radical as mentioned above;
- 45

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- C₃-C₄-alkynyloxy-C₁-C₄-alkyl is a C₁-C₄-alkyl radical as mentioned above which is substituted by a C₃-C₄-alkynyloxy radical as mentioned above;
- 5 - C₁-C₆-alkylthio-C₁-C₄-alkyl is a C₁-C₄-alkyl radical as mentioned above which is substituted by a C₁-C₆-alkylthio radical as mentioned above;
- C₃-C₆-alkenylthio-C₁-C₄-alkyl is a C₁-C₄-alkyl radical as mentioned above which is substituted by a C₃-C₆-alkenylthio radical as mentioned above;
- 10 - C₃-C₄-alkynylthio-C₁-C₄-alkyl is a C₁-C₄-alkyl radical as mentioned above which is substituted by a C₃-C₆-alkynylthio radical as mentioned above;
- 15 - C₁-C₆-alkylcarbonyl is a C₁-C₆-alkyl radical as mentioned above which is attached to the skeleton via a carbonyl group (-CO-);
- 20 - C₁-C₆-alkoxycarbonyl is a C₁-C₆-alkoxy radical as mentioned above which is attached to the skeleton via a carbonyl group (-CO-);
- C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl is a C₁-C₄-alkyl radical as mentioned above which is substituted by a C₁-C₆-alkylcarbonyl radical as mentioned above;
- 25 - C₁-C₆-alkoxycarbonyl-C₁-C₄-alkyl is a C₁-C₄-alkyl radical as mentioned above which is substituted by a C₁-C₆-alkoxycarbonyl radical as mentioned above;
- 30 - C₁-C₆-alkoxy-C₁-C₄-alkyl is a C₁-C₄-alkyl radical which is substituted by C₁-C₆-alkoxy as mentioned above, where the alkyl radical is defined as mentioned above;
- 35 - C₃-C₆-alkenyloxy-C₁-C₄-alkyl is a C₁-C₄-alkyl radical which is substituted by C₃-C₆-alkenyloxy as mentioned above, where the C₁-C₄-alkyl radical is defined as mentioned above;
- 40 - C₃-C₆-alkynyloxy-C₁-C₄-alkyl is a C₁-C₄-alkyl radical which is substituted by C₃-C₆-alkynyloxy as mentioned above, where the C₁-C₄-alkyl radical is defined as mentioned above;
- C₁-C₆-alkylthio-C₁-C₄-alkyl is a C₁-C₄-alkyl radical which is substituted by C₁-C₆-alkylthio as mentioned above, where the C₁-C₄-alkyl radical is defined as mentioned above;
- 45

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- C₁-C₆-alkoxy-C₁-C₄-alkoxy is a C₁-C₆-alkoxy radical which is substituted by C₁-C₄-alkoxy as mentioned above, where the C₁-C₄-alkoxy radical is defined as mentioned above;
- 5 - C₃-C₆-alkenyloxy-C₁-C₄-alkoxy is a C₁-C₄-alkoxy radical which is substituted by C₃-C₆-alkenyloxy as mentioned above, where the C₁-C₄-alkoxy radical is defined as mentioned above;
- C₃-C₄-alkynyloxy-C₁-C₄-alkoxy is a C₁-C₄-alkoxy radical which is substituted by C₃-C₄-alkynyloxy as mentioned above, where the C₁-C₄-alkoxy radical is defined as mentioned above;
- 10 - C₁-C₆-alkylthio-C₁-C₄-alkoxy is a C₁-C₄-alkoxy radical which is substituted by C₁-C₆-alkylthio as mentioned above, where the C₁-C₄-alkoxy radical is defined as mentioned above;
- 15 - C₃-C₆-alkenylthio-C₁-C₄-alkoxy is a C₁-C₄-alkoxy radical which is substituted by C₃-C₆-alkenylthio as mentioned above where the C₁-C₄-alkoxy radical is defined as mentioned above;
- 20 - C₃-C₆-alkynylthio-C₁-C₄-alkoxy is a C₁-C₄-alkoxy radical which is substituted by C₃-C₆-alkynylthio as mentioned above where the C₁-C₄-alkoxy radical is defined as mentioned above;
- 25 - C₁-C₆-alkylcarbonyl-C₁-C₄-alkoxy is a C₁-C₄-alkoxy radical which is substituted by C₁-C₆-alkylcarbonyl as mentioned above where the C₁-C₄-alkoxy radical is defined as mentioned above;
- C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkoxy is a C₁-C₄-alkoxy radical which is substituted by C₁-C₆-alkylcarbonyloxy as mentioned above where the C₁-C₄-alkoxy radical is defined as mentioned above;
- 30 - C₁-C₆-alkoxycarbonyl-C₁-C₄-alkoxy is a C₁-C₄-alkoxy radical which is substituted by C₁-C₆-alkoxycarbonyl as mentioned above where the C₁-C₄-alkoxy radical is defined as mentioned above;
- 35 - C₃-C₄-alkylene is n-propylene (-CH₂CH₂CH₂-) or n-butylene (-CH₂CH₂CH₂CH₂-);
- 40 - C₃-C₄-alkenylene is a divalent unbranched chain of one or two CH=CH- groups and/or one or two CH₂ groups in any position, for example -CH=CHCH₂-, CH₂CH=CHCH₂-, CH=CHCH₂CH₂- or CH=CH-CH=CH₂-;
- 45 - C₁-C₄-alkylamino is a C₁-C₄-alkyl radical as mentioned above which is attached to the skeleton via an amino group (-NH-);

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- C₁-C₆-alkylamino is a C₁-C₆-alkyl radical as mentioned above which is attached to the skeleton via an amino group (-NH-);
- C₁-C₄-dialkylamino are two independent C₁-C₄-alkyl radicals as mentioned above which are attached to the skeleton via a nitrogen atom (>N-);
- C₁-C₆-dialkylamino are two independent C₁-C₆-alkyl radicals as mentioned above which are attached to the skeleton via a nitrogen atom (>N-).

With respect to the use of the substituted phenylalanine derivatives I as herbicides, preference is given to those compounds I in which the substituents are as defined above, in each case on their own or in combination:

- R¹ is hydrogen, halogen, nitro, cyano, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₃-C₆-haloalkenyloxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₁-C₆-haloalkylsulfonyl or C₃-C₆-haloalkenylsulfonyl; preferably hydrogen, halogen, cyano, C₁-C₆-alkyl, C₁-C₆-alkylthio, C₁-C₆-alkylsulfinyl or C₁-C₆-alkylsulfonyl; particularly preferably hydrogen, cyano, halogen or C₁-C₆ alkyl;
- R² is hydrogen, halogen, nitro, cyano, C₁-C₆-alkyl, C₂-C₆-alkynyl, C₁-C₆-alkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₃-C₆-haloalkenyloxy or C₃-C₆-halogenalkynyloxy; preferably hydrogen, halogen, cyano, C₁-C₆-haloalkyl or C₁-C₆-alkyl; particularly preferably hydrogen or C₁-C₆-haloalkyl; furthermore particularly preferably halogen or C₁-C₆-alkyl; very particularly preferably hydrogen, halogen or C₁-C₆-alkyl;
- R³ is hydrogen, halogen, C₁-C₆-alkyl or C₁-C₆-haloalkyl; preferably hydrogen or halogen;

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- R⁴ is hydrogen, halogen, nitro, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-haloalkyl or C₁-C₆-haloalkoxy;
preferably hydrogen, halogen, C₁-C₆-alkyl or C₁-C₆-haloalkyl;
5 particularly preferably hydrogen or halogen;
very particularly preferably hydrogen;
- R⁵ is hydrogen, halogen, nitro, cyano, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy or C₃-C₆-haloalkenyloxy; preferably hydrogen, halogen, C₁-C₆-alkyl or C₁-C₆-haloalkyl, particularly preferably hydrogen;
likewise particularly preferably C₁-C₆-alkyl or halogen;
15
- R⁶ is hydrogen or C₁-C₆-alkyl;
- R⁷ is hydrogen, halogen, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl or C₁-C₆-haloalkyl;
preferably hydrogen, C₁-C₆-alkyl, C₂-C₆-alkenyl or C₂-C₆-alkynyl;
20 particularly preferably also C₁-C₆-alkyl or hydrogen;
- R⁸ is methyl or methoxy;
25 likewise hydroxyl;
- R⁹ is hydrogen or methyl;
preferably hydrogen;
when R⁸ is hydroxyl, preferably methyl;
30
- R¹⁰ is hydrogen, C₁-C₆-alkyl, C₁-C₆-alkoxycarbonyl, C₁-C₄-haloalkoxycarbonyl;
preferably hydrogen;
- 35 R¹¹ is halogen, nitro, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl or CO-R¹⁶;
preferably halogen, cyano, C₁-C₆-alkylthio, C₁-C₆-alkylsulfinyl, C₁-C₆-alkylsulfonyl, C₁-C₆-alkyl, C₁-C₆-haloalkyl or CO-R¹⁶;
45 in addition preferably C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio; particularly preferably halogen, cyano, C₁-C₆-alkylthio,

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- C₁-C₆-alkylsulfinyl, C₁-C₆-alkylsulfonyl, C₁-C₆-alkyl or C₁-C₆-haloalkyl;
likewise particularly preferably C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio;
5 very particularly preferably halogen or C₁-C₆-haloalkyl, where the halogen substituent in C₁-C₆-haloalkyl is preferably fluorine;
furthermore very particularly preferably C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio, C₁-C₆-alkylsulfonyl or
10 C₁-C₆-alkylsulfinyl, where the halogen substituent in C₁-C₆-haloalkyl, C₁-C₆-haloalkylthio, C₁-C₆-alkylsulfonyl or C₁-C₆-alkylsulfinyl is preferably fluorine;
- R¹³ is hydrogen, halogen, nitro, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy,
15 C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio,
20 C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl or CO-R¹⁶; preferably hydrogen, halogen, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₁-C₆-alkylsulfinyl, C₁-C₆-alkylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy or
25 C₁-C₆-haloalkylthio or CO-R¹⁶; particularly preferably hydrogen, halogen, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₁-C₆-alkylsulfinyl, C₁-C₆-alkylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy or C₁-C₆-haloalkylthio;
30 very particularly preferably halogen, such as, for example, chlorine and fluorine, C₁-C₆-alkyl, C₁-C₆-haloalkyl, where the halogen substituent in C₁-C₆-haloalkyl is preferably fluorine; likewise very particularly preferably hydrogen;
- 35 R¹² and R¹⁴ are hydrogen, halogen, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio,
40 C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl, or CO-R¹⁶; preferably hydrogen, halogen, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₁-C₆-alkylsulfinyl,
45 C₁-C₆-alkylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio or CO-R¹⁶; particularly preferably hydrogen, halogen, cyano, C₁-C₆-alkyl,

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- C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₁-C₆-alkylsulfinyl, C₁-C₆-alkylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy or C₁-C₆-haloalkylthio;
- 5 R¹² is very particularly preferably hydrogen or halogen, such as, for example, chlorine and fluorine, C₁-C₆-alkyl, C₁-C₆-haloalkyl, where the halogen substituent in C₁-C₆-haloalkyl is preferably fluorine;
- 10 R¹² is furthermore very particularly preferably cyano, C₁-C₆-haloalkoxy or C₁-C₆-haloalkylthio, where the halogen substituent in C₁-C₆-haloalkyl or C₁-C₆-haloalkylthio is preferably fluorine;
- 15 R¹⁴ is furthermore very particularly preferably hydrogen;
- R¹⁵ is hydrogen, halogen, C₁-C₆-alkyl or C₁-C₆-haloalkyl; preferably hydrogen; and
- 20 R¹⁶ is hydrogen, hydroxyl, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₁-C₆-alkoxy, C₁-C₆-haloalkoxy, C₁-C₆-alkylamino or di(C₁-C₆-alkyl)amino, preferably C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₁-C₆-alkoxy, C₁-C₆-haloalkoxy, C₁-C₆-alkylamino or di(C₁-C₆-alkyl)amino.
- 25 Preference is furthermore given to phenylalanine derivatives of the formula I where in each case independently of one another
- 30 R¹ is hydrogen, halogen, such as fluorine, chlorine or bromine, cyano, C₁-C₄-alkyl, such as methyl, ethyl, n-propyl or isopropyl; preferably hydrogen, fluorine, methyl; furthermore preferably chlorine or ethyl;
- 35 R² is hydrogen, C₁-C₄-haloalkyl, such as fluoromethyl, difluoromethyl or trifluoromethyl, halogen, such as fluorine, chlorine or bromine; likewise C₁-C₄-alkyl such as methyl, ethyl, n-propyl or isopropyl; preferably hydrogen or C₁-C₄-alkyl, such as methyl, ethyl,
- 40 n-propyl or isopropyl; in addition preferably fluorine, chlorine or bromine; particularly preferably hydrogen, fluorine, chlorine or methyl;
- 45 R³ is hydrogen, halogen, such as fluorine, chlorine or bromine, C₁-C₄-alkyl, such as methyl, ethyl, n-propyl or isopropyl; preferably hydrogen, fluorine, chlorine or bromine;

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furthermore preferably methyl;
particularly preferably hydrogen, fluorine or chlorine;

- 5 R⁴ is hydrogen, C₁-C₄-haloalkyl, such as fluoromethyl, difluoromethyl or trifluoromethyl, halogen, such as fluorine, chlorine or bromine, C₁-C₄-alkyl, such as methyl, ethyl, n-propyl or isopropyl; preferably hydrogen;
- 10 R⁵ is hydrogen, C₁-C₄-haloalkyl such as fluoromethyl, difluoromethyl or trifluoromethyl, halogen, such as fluorine, chlorine or bromine, C₁-C₄-alkyl, such as methyl, ethyl, n-propyl or isopropyl; preferably hydrogen;
- 15 in addition preferably fluorine, chlorine or methyl.

Preference is furthermore given to phenylalanine derivatives of the formula I where in each case independently of one another

- 20 R⁷ is hydrogen, haloalkyl, such as fluoromethyl, difluoromethyl or trifluoromethyl, halogen, such as fluorine, chlorine or bromine, C₁-C₄-alkyl, such as methyl, ethyl, n-propyl or isopropyl, or C₂-C₄-alkenyl, such as ethenyl, prop-1-en-1-yl, 1-methylethenyl, but-1-en-1-yl, but-1-en-2-yl,
- 25 1-methylprop-1-en-1-yl or 2-methylprop-1-en-1-yl, C₂-C₄-alkynyl, such as ethynyl, prop-1-yn-1-yl or n-but-1-yn-1-yl; preferably hydrogen, C₁-C₄-alkyl, such as methyl or ethyl, or C₂-C₄-alkenyl, such as ethenyl, prop-1-en-1-yl,
- 30 1-methylethenyl, but-1-en-1-yl, but-1-en-2-yl, 1-methylprop-1-en-1-yl or 2-methylprop-1-en-1-yl; particularly preferably hydrogen or methyl; furthermore particularly preferably ethyl; and
- 35 R⁶ is hydrogen.

Preference is furthermore given to phenylalanine derivatives of the formula I where R¹⁰ is hydrogen.

- 40 Preference is is furthermore given to phenylalanine derivatives of the formula I where in each case independently of one another

R⁸ is C₁-C₆-alkoxy or hydroxyl and

- 45 R⁹ is hydrogen, C₁-C₆-alkyl, preferably methyl.

19

Preference is also given to compounds I in which

R⁸ is methyl or ethyl, preferably methyl, and

5 R⁹ is hydrogen or C₁-C₆-alkyl, preferably hydrogen.

Particular preference is given to compounds I in which

10 R⁸ is C₁-C₄-alkoxy, C₁-C₄-alkyl or hydroxyl;
preferably methoxy, methyl or hydroxyl;

R⁹ is hydrogen, C₁-C₆-alkyl, preferably hydrogen or methyl.

In this case, R⁹ is then preferably methyl, if R⁸ is hydroxyl.

15

Preference is also given to compounds I in which

R⁸ is methyl and

20 R⁹ is hydrogen.

Preference is furthermore given to phenylalanine derivatives of the formula I where in each case independently of one another

25 R¹¹ is cyano, C₁-C₄-alkyl, such as methyl, ethyl, n-propyl or isopropyl, C₁-C₄-haloalkyl, such as fluoromethyl, difluoromethyl or trifluoromethyl, halogen, such as fluorine, chlorine or bromine, C₁-C₄-alkylsulfonyl, such as

30 methylsulfonyl, ethylsulfonyl, n-propylsulfonyl or isopropylsulfonyl, or CO-R¹⁶;
in addition C₁-C₄-haloalkoxy, such as fluoromethoxy, difluoromethoxy, trifluoromethoxy, or C₁-C₄-haloalkylthio, such as fluorothiomethyl, difluorothiomethyl or trifluorothiomethyl, or C₁-C₄-alkylsulfinyl, such as

35 methylsulfinyl, ethylsulfinyl, n-propylsulfinyl or isopropylsulfinyl;
preferably cyano, C₁-C₄-alkyl, such as methyl, ethyl, n-propyl or isopropyl, C₁-C₄-haloalkyl, such as fluoromethyl, difluoromethyl or trifluoromethyl, halogen, such as fluorine, chlorine or bromine, C₁-C₄-alkylsulfonyl, such as

40 methylsulfonyl, ethylsulfonyl, n-propylsulfonyl or isopropylsulfonyl;
likewise preferably C₁-C₄-haloalkoxy, such as fluoromethoxy, difluoromethoxy, or trifluoromethoxy, or C₁-C₄-haloalkylthio, such as fluorothiomethyl, difluorothiomethyl or

45 trifluorothiomethyl, or C₁-C₄-alkylsulfinyl, such as methylsulfinyl, ethylsulfinyl, n-propylsulfinyl or

20

- isopropylsulfinyl;
particularly preferably trifluoromethyl, chlorine, bromine;
furthermore particularly preferably fluorine, fluoromethyl,
difluoromethyl, fluoromethoxy, difluoromethoxy or
5 trifluoromethoxy, fluorothiomethyl, difluorothiomethyl or
trifluorothiomethyl, methylsulfonyl or methylsulfinyl;
- R¹², R¹³ and R¹⁴ are hydrogen, cyano, halogen, such as fluorine,
chlorine or bromine, C₁-C₄-haloalkyl, such as fluoromethyl,
10 difluoromethyl or trifluoromethyl, C₁-C₄-alkyl, such as
methyl, ethyl, n-propyl or isopropyl, C₁-C₄-alkylsulfonyl,
such as methylsulfonyl, ethylsulfonyl, n-propylsulfonyl or
isopropylsulfonyl, C₁-C₄-alkoxy, such as methoxy, ethoxy,
n-propoxy or isopropoxy, halomethoxy, such as fluoromethoxy,
15 difluoromethoxy or trifluoromethoxy, or CO-R¹⁶;
furthermore halomethylthio, such as fluorothiomethyl,
difluorothiomethyl or trifluorothiomethyl;
preferably hydrogen, cyano, halogen, such as fluorine,
chlorine or bromine, C₁-C₄-haloalkyl, such as fluoromethyl,
20 difluoromethyl or trifluoromethyl, C₁-C₄-alkyl, such as
methyl, ethyl, n-propyl or isopropyl, C₁-C₄-alkylsulfonyl,
such as methylsulfonyl, ethylsulfonyl, n-propylsulfonyl or
isopropylsulfonyl, C₁-C₄-alkoxy, such as methoxy, ethoxy,
n-propoxy or isopropoxy, halomethoxy, such as fluoromethoxy,
25 difluoromethoxy or trifluoromethoxy;
furthermore halomethylthio, such as fluorothiomethyl,
difluorothiomethyl or trifluorothiomethyl;
particularly preferably hydrogen, halogen, such as fluorine
or chlorine, C₁-C₄-haloalkyl, such as fluoromethyl,
30 difluoromethyl or trifluoromethyl, C₁-C₄-alkyl, such as
methyl, ethyl, n-propyl or isopropyl;
likewise particularly preferably halomethoxy, such as
fluoromethoxy, difluoromethoxy or trifluoromethoxy,
halomethylthio, such as fluorothiomethyl, difluorothiomethyl,
35 or trifluorothiomethyl;
- R¹² is very particularly preferably hydrogen, cyano, fluorine,
chlorine, methyl, fluoromethyl, difluoromethyl or
trifluoromethyl, fluoromethoxy, difluoromethoxy,
40 trifluoromethoxy, fluorothiomethyl, difluorothiomethyl,
trifluorothiomethyl,
- R¹³ is very particularly preferably hydrogen, fluorine or
chlorine;
- 45 R¹⁴ is very particularly preferably hydrogen;

21

R¹⁵ is hydrogen; and

5 R¹⁶ is C₁-C₄-alkoxy, such as methoxy, ethoxy, n-propoxy, isopropoxy, n-butoxy or t-butoxy, C₁-C₄-alkyl, such as methyl, ethyl, n-propyl or isopropyl, C₁-alkyl, such as fluoromethyl, difluoromethyl or trifluoromethyl, or C₁-haloalkoxy, such as fluoromethoxy, difluoromethoxy or trifluoromethoxy.

10 Preference is also given to phenylalanine derivatives of the formula I in which the radicals

R¹, R², R⁴ and R⁵ are hydrogen, halogen, hydroxyl, mercapto, nitro, cyano, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl, 15 C₁-C₆-alkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, 20 C₂-C₆-haloalkenyl, C₂-C₆-haloalkynyl, C₁-C₆-haloalkoxy, C₃-C₆-haloalkenyloxy, C₃-C₆-haloalkynyloxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₃-C₆-haloalkynylthio, C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₃-C₆-haloalkynylsulfinyl, 25 C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl, C₃-C₆-haloalkynylsulfonyl, formyl, C₁-C₆-alkylcarbonyloxy, C₁-C₆-alkoxy-C₁-C₄-alkyl, C₃-C₆-alkenyloxy-C₁-C₄-alkyl, C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl, 30 C₃-C₆-alkenylthio-C₁-C₄-alkyl, C₃-C₄-alkynylthio-C₁-C₄-alkyl, C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl, C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl, C₁-C₆-alkoxycarbonyl-C₁-C₄-alkyl, C₁-C₆-alkoxy-C₁-C₄-alkoxy, C₃-C₆-alkenyloxy-C₁-C₄-alkoxy, 35 C₃-C₄-alkynyloxy-C₁-C₄-alkoxy, C₁-C₆-alkylthio-C₁-C₄-alkoxy, C₃-C₆-alkenylthio-C₁-C₄-alkoxy, C₃-C₆-alkynylthio-C₁-C₄-alkoxy, C₁-C₆-alkylcarbonyl-C₁-C₄-alkoxy, C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkoxy, C₁-C₆-alkoxycarbonyl-C₁-C₄-alkoxy or CO-R¹⁶;

40

R³ is hydrogen, mercapto, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, 45 C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl, C₂-C₆-haloalkynyl, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₃-C₆-haloalkynylthio,

22

- C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl,
 C₃-C₆-haloalkynylsulfinyl, C₁-C₆-haloalkylsulfonyl,
 C₃-C₆-haloalkenylsulfonyl, C₃-C₆-haloalkynylsulfonyl,
 C₁-C₆-alkoxy-C₁-C₄-alkyl, C₃-C₆-alkenyloxy-C₁-C₄-alkyl,
 5 C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl,
 C₃-C₆-alkenylthio-C₁-C₄-alkyl, C₃-C₆-alkynylthio-C₁-C₄-alkyl,
 C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl,
 C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl,
 C₁-C₆-alkyloxycarbonyl-C₁-C₄-alkyl, or CO-R¹⁶.

10

Preference is also given to phenylalanine derivatives of the formula I in which R¹, R², R³, R⁴ and R⁵ are hydrogen.

15 Preference is also given to phenylalanine derivatives of the formula I in which

R¹, R² and R³ in each case independently of one another are hydrogen, fluorine, chlorine, methyl or trifluoromethyl;

R⁴, R⁵, R⁶, R⁹, R¹⁰ and R¹⁵ are hydrogen;

20

R⁷ is hydrogen or methyl;

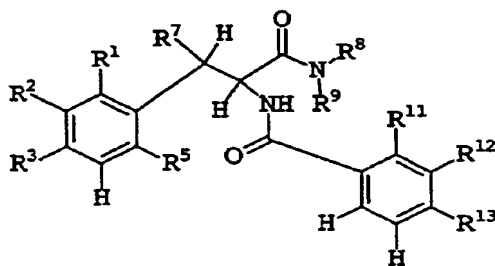
R⁸ is methyl;

25 R¹¹, R¹², R¹³ and R¹⁴ in each case independently of one another are hydrogen, bromine, methylsulfonyl, fluorine, chlorine, methyl, trifluoromethyl, difluoromethyl, methoxy, cyano, preferably H, fluorine, chlorine, methyl, trifluoromethyl, difluoromethyl, methoxy or cyano.

30

Particular preference is also given to phenylalanine derivatives of the formula I' (R⁴, R⁶, R¹⁰, R¹⁴ and R¹⁵ are hydrogen) in which

35



I'

40

45 R¹, R², R³, R⁵ in each case independently of one another are hydrogen, fluorine, chlorine, methyl or ethyl;

23

- R⁷ is hydrogen, methyl or ethyl;
- R⁸ is methoxy, methyl or hydroxyl;
- 5 R⁹ is hydrogen;
is methyl if R⁸ is hydroxyl;
- R¹¹ is fluorine, chlorine, halomethyl, such as fluoromethyl,
difluoromethyl, trifluoromethyl, halomethoxy, such as
10 fluoromethoxy, difluoromethoxy, trifluoromethoxy,
halothioalkyl, such as fluorothiomethyl, difluorothiomethyl,
trifluorothiomethyl, methylsulfinyl or methylsulfonyl;
- R¹² is hydrogen, cyano, methyl, fluorine, chlorine, halomethyl,
15 such as fluoromethyl, difluoromethyl, trifluoromethyl,
halomethoxy, such as fluoromethoxy, difluoromethoxy,
trifluoromethoxy, halothioalkyl, such as fluorothiomethyl,
difluorothiomethyl, trifluorothiomethyl;
- 20 R¹³ is hydrogen, fluorine, chlorine.

In particular with a view to their use, preference is also given to the compounds I' compiled in the tables below.

25 Table 1:

Compounds of the formula I' (R⁴, R⁶, R¹⁰, R¹⁴ and R¹⁵ are hydrogen) in which R³ is H, R⁵ is H, R⁷ is H, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a
30 compound corresponds in each case to a row of table A.

Table 2:

Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is H, R⁹
35 is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 3:

40 Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is H, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

45

Table 4:

24

Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is H, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

5

Tabelle 5:

Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

10

Table 6:

Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

20 Table 7:

Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

25

Table 8:

Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

30

Table 9:

35

Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

40

Table 10:

Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

45

25

Table 11:

Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OH and the combination of the 5 substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 12:

10 Compounds of the formula I', in which R³ is H, R⁵ is H, R⁷ is CH₂CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

15 Table 13:

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is H, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row 20 of table A.

Table 14:

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is H, R⁹ 25 is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 15:

30

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is H, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

35

Table 16:

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is H, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, 40 R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 17:

45

26

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

5

Table 18:

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

10

Table 19:

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

20 Table 20:

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 21:

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 22:

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Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 23:

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 24:

Compounds of the formula I', in which R³ is H, R⁵ is F, R⁷ is CH₂CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the 5 substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 25:

10 Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is H, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

15 Table 26:

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is H, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a 20 row of table A.

Table 27:

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is H, 25 R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 28:

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Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is H, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 29:

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, 40 R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 30:

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28

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 31:

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 32:

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

20 Table 33:

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 34:

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 35:

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 36:

Compounds of the formula I', in which R³ is H, R⁵ is Cl, R⁷ is CH₂CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 37:

Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is H, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 38:

10 Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is H, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

15 Table 39:

Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is H, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 40:

Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is H, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 41:

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Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 42:

Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 43:

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Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 44:

Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 45:

Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

20 Table 46:

Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 47:

Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 48:

Compounds of the formula I', in which R³ is H, R⁵ is CH₃, R⁷ is CH₂CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 49:

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is H, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 50:

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is H, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 51:

10 Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is H, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

15 Table 52:

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is H, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 53:

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 54:

30

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 55:

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 56:

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32

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 57:

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 58:

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

20 Table 59:

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 60:

Compounds of the formula I', in which R³ is F, R⁵ is H, R⁷ is CH₂CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 61:

35

Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is H, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 62:

Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is H, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 63:

Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is H, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 64:

10 Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is H, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

15 Table 65:

Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 66:

25 Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 67:

30

Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 68:

40 Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 69:

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Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 70:

Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 71:

Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

20 Table 72:

Compounds of the formula I', in which R³ is F, R⁵ is F, R⁷ is CH₂CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 73:

Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is H, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 74:

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Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is H, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 75:

Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is H, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 76:

Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is H, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 77:

10 Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

15 Table 78:

Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 79:

Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 80:

30 Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 81:

Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 82:

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Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 83:

Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 84:

Compounds of the formula I', in which R³ is F, R⁵ is Cl, R⁷ is CH₂CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 85:

Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is H, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 86:

Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is H, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

35 Table 87:

Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is H, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 88:

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Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is H, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 89:

Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 90:

Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

20 Table 91:

Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is CH₃, R⁹ is H and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 92:

Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 93:

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Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is CH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 94:

Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OCH₃ and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 95:

Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is CH₂CH₃, R⁹ is H and R⁸ is OH and the combination of the 5 substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

Table 96:

10 Compounds of the formula I', in which R³ is F, R⁵ is CH₃, R⁷ is CH₂CH₃, R⁹ is CH₃ and R⁸ is OH and the combination of the substituents R¹, R², R¹¹, R¹² and R¹³ for a compound corresponds in each case to a row of table A.

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Table 1

	No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
5	A-1	H	H	F	H	H
	A-2	F	H	F	H	H
	A-3	Cl	H	F	H	H
	A-4	CH ₃	H	F	H	H
10	A-5	CH ₂ CH ₃	H	F	H	H
	A-6	H	H	Cl	H	H
	A-7	F	H	Cl	H	H
	A-8	Cl	H	Cl	H	H
15	A-9	CH ₃	H	Cl	H	H
	A-10	CH ₂ CH ₃	H	Cl	H	H
	A-11	H	H	CHF ₂	H	H
	A-12	F	H	CHF ₂	H	H
20	A-13	Cl	H	CHF ₂	H	H
	A-14	CH ₃	H	CHF ₂	H	H
	A-15	CH ₂ CH ₃	H	CHF ₂	H	H
	A-16	H	H	CF ₃	H	H
25	A-17	F	H	CF ₃	H	H
	A-18	Cl	H	CF ₃	H	H
	A-19	CH ₃	H	CF ₃	H	H
	A-20	CH ₂ CH ₃	H	CF ₃	H	H
30	A-21	H	H	SCHF ₂	H	H
	A-22	F	H	SCHF ₂	H	H
	A-23	Cl	H	SCHF ₂	H	H
	A-24	CH ₃	H	SCHF ₂	H	H
35	A-25	CH ₂ CH ₃	H	SCHF ₂	H	H
	A-26	H	H	SCF ₃	H	H
	A-27	F	H	SCF ₃	H	H
	A-28	Cl	H	SCF ₃	H	H
40	A-29	CH ₃	H	SCF ₃	H	H
	A-30	CH ₂ CH ₃	H	SCF ₃	H	H
	A-31	H	H	OCHF ₂	H	H
	A-32	F	H	OCHF ₂	H	H
45	A-33	Cl	H	OCHF ₂	H	H
	A-34	CH ₃	H	OCHF ₂	H	H
	A-35	CH ₂ CH ₃	H	OCHF ₂	H	H
	A-36	H	H	OCF ₃	H	H
	A-37	F	H	OCF ₃	H	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-38	Cl	H	OCF ₃	H	H
A-39	CH ₃	H	OCF ₃	H	H
5 A-40	CH ₂ CH ₃	H	OCF ₃	H	H
A-41	H	H	F	F	H
A-42	F	H	F	F	H
A-43	Cl	H	F	F	H
10 A-44	CH ₃	H	F	F	H
A-45	CH ₂ CH ₃	H	F	F	H
A-46	H	H	Cl	F	H
A-47	F	H	Cl	F	H
A-48	Cl	H	Cl	F	H
15 A-49	CH ₃	H	Cl	F	H
A-50	CH ₂ CH ₃	H	Cl	F	H
A-51	H	H	CHF ₂	F	H
A-52	F	H	CHF ₂	F	H
20 A-53	Cl	H	CHF ₂	F	H
A-54	CH ₃	H	CHF ₂	F	H
A-55	CH ₂ CH ₃	H	CHF ₂	F	H
A-56	H	H	CF ₃	F	H
25 A-57	F	H	CF ₃	F	H
A-58	Cl	H	CF ₃	F	H
A-59	CH ₃	H	CF ₃	F	H
A-60	CH ₂ CH ₃	H	CF ₃	F	H
A-61	H	H	SCHF ₂	F	H
30 A-62	F	H	SCHF ₂	F	H
A-63	Cl	H	SCHF ₂	F	H
A-64	CH ₃	H	SCHF ₂	F	H
A-65	CH ₂ CH ₃	H	SCHF ₂	F	H
35 A-66	H	H	SCF ₃	F	H
A-67	F	H	SCF ₃	F	H
A-68	Cl	H	SCF ₃	F	H
A-69	CH ₃	H	SCF ₃	F	H
40 A-70	CH ₂ CH ₃	H	SCF ₃	F	H
A-71	H	H	OCHF ₂	F	H
A-72	F	H	OCHF ₂	F	H
A-73	Cl	H	OCHF ₂	F	H
A-74	CH ₃	H	OCHF ₂	F	H
45 A-75	CH ₂ CH ₃	H	OCHF ₂	F	H
A-76	H	H	OCF ₃	F	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-77	F	H	OCF ₃	F	H
	A-78	Cl	H	OCF ₃	F	H
	A-79	CH ₃	H	OCF ₃	F	H
	A-80	CH ₂ CH ₃	H	OCF ₃	F	H
	A-81	H	H	F	Cl	H
10	A-82	F	H	F	Cl	H
	A-83	Cl	H	F	Cl	H
	A-84	CH ₃	H	F	Cl	H
	A-85	CH ₂ CH ₃	H	F	Cl	H
	A-86	H	H	Cl	Cl	H
15	A-87	F	H	Cl	Cl	H
	A-88	Cl	H	Cl	Cl	H
	A-89	CH ₃	H	Cl	Cl	H
	A-90	CH ₂ CH ₃	H	Cl	Cl	H
	A-91	H	H	CHF ₂	Cl	H
20	A-92	F	H	CHF ₂	Cl	H
	A-93	Cl	H	CHF ₂	Cl	H
	A-94	CH ₃	H	CHF ₂	Cl	H
	A-95	CH ₂ CH ₃	H	CHF ₂	Cl	H
	A-96	H	H	CF ₃	Cl	H
25	A-97	F	H	CF ₃	Cl	H
	A-98	Cl	H	CF ₃	Cl	H
	A-99	CH ₃	H	CF ₃	Cl	H
	A-100	CH ₂ CH ₃	H	CF ₃	Cl	H
	A-101	H	H	SCHF ₂	Cl	H
30	A-102	F	H	SCHF ₂	Cl	H
	A-103	Cl	H	SCHF ₂	Cl	H
	A-104	CH ₃	H	SCHF ₂	Cl	H
	A-105	CH ₂ CH ₃	H	SCHF ₂	Cl	H
	A-106	H	H	SCF ₃	Cl	H
35	A-107	F	H	SCF ₃	Cl	H
	A-108	Cl	H	SCF ₃	Cl	H
	A-109	CH ₃	H	SCF ₃	Cl	H
	A-110	CH ₂ CH ₃	H	SCF ₃	Cl	H
	A-111	H	H	OCHF ₂	Cl	H
40	A-112	F	H	OCHF ₂	Cl	H
	A-113	Cl	H	OCHF ₂	Cl	H
	A-114	CH ₃	H	OCHF ₂	Cl	H
	A-115	CH ₂ CH ₃	H	OCHF ₂	Cl	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-116	H	H	OCF ₃	Cl	H
	A-117	F	H	OCF ₃	Cl	H
	A-118	Cl	H	OCF ₃	Cl	H
	A-119	CH ₃	H	OCF ₃	Cl	H
	A-120	CH ₂ CH ₃	H	OCF ₃	Cl	H
10	A-121	H	H	F	CHF ₂	H
	A-122	F	H	F	CHF ₂	H
	A-123	Cl	H	F	CHF ₂	H
	A-124	CH ₃	H	F	CHF ₂	H
	A-125	CH ₂ CH ₃	H	F	CHF ₂	H
15	A-126	H	H	Cl	CHF ₂	H
	A-127	F	H	Cl	CHF ₂	H
	A-128	Cl	H	Cl	CHF ₂	H
	A-129	CH ₃	H	Cl	CHF ₂	H
	A-130	CH ₂ CH ₃	H	Cl	CHF ₂	H
20	A-131	H	H	CHF ₂	CHF ₂	H
	A-132	F	H	CHF ₂	CHF ₂	H
	A-133	Cl	H	CHF ₂	CHF ₂	H
	A-134	CH ₃	H	CHF ₂	CHF ₂	H
	A-135	CH ₂ CH ₃	H	CHF ₂	CHF ₂	H
25	A-136	H	H	CF ₃	CHF ₂	H
	A-137	F	H	CF ₃	CHF ₂	H
	A-138	Cl	H	CF ₃	CHF ₂	H
	A-139	CH ₃	H	CF ₃	CHF ₂	H
	A-140	CH ₂ CH ₃	H	CF ₃	CHF ₂	H
30	A-141	H	H	SCHF ₂	CHF ₂	H
	A-142	F	H	SCHF ₂	CHF ₂	H
	A-143	Cl	H	SCHF ₂	CHF ₂	H
	A-144	CH ₃	H	SCHF ₂	CHF ₂	H
	A-145	CH ₂ CH ₃	H	SCHF ₂	CHF ₂	H
35	A-146	H	H	SCF ₃	CHF ₂	H
	A-147	F	H	SCF ₃	CHF ₂	H
	A-148	Cl	H	SCF ₃	CHF ₂	H
	A-149	CH ₃	H	SCF ₃	CHF ₂	H
	A-150	CH ₂ CH ₃	H	SCF ₃	CHF ₂	H
40	A-151	H	H	OCHF ₂	CHF ₂	H
	A-152	F	H	OCHF ₂	CHF ₂	H
	A-153	Cl	H	OCHF ₂	CHF ₂	H
	A-154	CH ₃	H	OCHF ₂	CHF ₂	H
	45					

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-155	CH ₂ CH ₃	H	OCHF ₂	CHF ₂	H
A-156	H	H	OCF ₃	CHF ₂	H
5 A-157	F	H	OCF ₃	CHF ₂	H
A-158	Cl	H	OCF ₃	CHF ₂	H
A-159	CH ₃	H	OCF ₃	CHF ₂	H
A-160	CH ₂ CH ₃	H	OCF ₃	CHF ₂	H
10 A-161	H	H	F	CF ₃	H
A-162	F	H	F	CF ₃	H
A-163	Cl	H	F	CF ₃	H
A-164	CH ₃	H	F	CF ₃	H
A-165	CH ₂ CH ₃	H	F	CF ₃	H
15 A-166	H	H	Cl	CF ₃	H
A-167	F	H	Cl	CF ₃	H
A-168	Cl	H	Cl	CF ₃	H
A-169	CH ₃	H	Cl	CF ₃	H
20 A-170	CH ₂ CH ₃	H	Cl	CF ₃	H
A-171	H	H	CHF ₂	CF ₃	H
A-172	F	H	CHF ₂	CF ₃	H
A-173	Cl	H	CHF ₂	CF ₃	H
25 A-174	CH ₃	H	CHF ₂	CF ₃	H
A-175	CH ₂ CH ₃	H	CHF ₂	CF ₃	H
A-176	H	H	CF ₃	CF ₃	H
A-177	F	H	CF ₃	CF ₃	H
30 A-178	Cl	H	CF ₃	CF ₃	H
A-179	CH ₃	H	CF ₃	CF ₃	H
A-180	CH ₂ CH ₃	H	CF ₃	CF ₃	H
A-181	H	H	SCHF ₂	CF ₃	H
A-182	F	H	SCHF ₂	CF ₃	H
35 A-183	Cl	H	SCHF ₂	CF ₃	H
A-184	CH ₃	H	SCHF ₂	CF ₃	H
A-185	CH ₂ CH ₃	H	SCHF ₂	CF ₃	H
A-186	H	H	SCF ₃	CF ₃	H
40 A-187	F	H	SCF ₃	CF ₃	H
A-188	Cl	H	SCF ₃	CF ₃	H
A-189	CH ₃	H	SCF ₃	CF ₃	H
A-190	CH ₂ CH ₃	H	SCF ₃	CF ₃	H
45 A-191	H	H	OCHF ₂	CF ₃	H
A-192	F	H	OCHF ₂	CF ₃	H
A-193	Cl	H	OCHF ₂	CF ₃	H

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-194	CH ₃	H	OCHF ₂	CF ₃	H
	A-195	CH ₂ CH ₃	H	OCHF ₂	CF ₃	H
	A-196	H	H	OCF ₃	CF ₃	H
	A-197	F	H	OCF ₃	CF ₃	H
	A-198	Cl	H	OCF ₃	CF ₃	H
10	A-199	CH ₃	H	OCF ₃	CF ₃	H
	A-200	CH ₂ CH ₃	H	OCF ₃	CF ₃	H
	A-201	H	H	F	H	F
	A-202	F	H	F	H	F
	A-203	Cl	H	F	H	F
15	A-204	CH ₃	H	F	H	F
	A-205	CH ₂ CH ₃	H	F	H	F
	A-206	H	H	Cl	H	F
	A-207	F	H	Cl	H	F
	A-208	Cl	H	Cl	H	F
20	A-209	CH ₃	H	Cl	H	F
	A-210	CH ₂ CH ₃	H	Cl	H	F
	A-211	H	H	CHF ₂	H	F
	A-212	F	H	CHF ₂	H	F
	A-213	Cl	H	CHF ₂	H	F
25	A-214	CH ₃	H	CHF ₂	H	F
	A-215	CH ₂ CH ₃	H	CHF ₂	H	F
	A-216	H	H	CF ₃	H	F
	A-217	F	H	CF ₃	H	F
	A-218	Cl	H	CF ₃	H	F
30	A-219	CH ₃	H	CF ₃	H	F
	A-220	CH ₂ CH ₃	H	CF ₃	H	F
	A-221	H	H	SCHF ₂	H	F
	A-222	F	H	SCHF ₂	H	F
	A-223	Cl	H	SCHF ₂	H	F
35	A-224	CH ₃	H	SCHF ₂	H	F
	A-225	CH ₂ CH ₃	H	SCHF ₂	H	F
	A-226	H	H	SCF ₃	H	F
	A-227	F	H	SCF ₃	H	F
	A-228	Cl	H	SCF ₃	H	F
40	A-229	CH ₃	H	SCF ₃	H	F
	A-230	CH ₂ CH ₃	H	SCF ₃	H	F
	A-231	H	H	OCHF ₂	H	F
	A-232	F	H	OCHF ₂	H	F
	A-232	F	H	OCHF ₂	H	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-233	Cl	H	OCHF ₂	H	F
	A-234	CH ₃	H	OCHF ₂	H	F
	A-235	CH ₂ CH ₃	H	OCHF ₂	H	F
	A-236	H	H	OCF ₃	H	F
	A-237	F	H	OCF ₃	H	F
10	A-238	Cl	H	OCF ₃	H	F
	A-239	CH ₃	H	OCF ₃	H	F
	A-240	CH ₂ CH ₃	H	OCF ₃	H	F
	A-241	H	H	F	F	F
	A-242	F	H	F	F	F
15	A-243	Cl	H	F	F	F
	A-244	CH ₃	H	F	F	F
	A-245	CH ₂ CH ₃	H	F	F	F
	A-246	H	H	Cl	F	F
	A-247	F	H	Cl	F	F
20	A-248	Cl	H	Cl	F	F
	A-249	CH ₃	H	Cl	F	F
	A-250	CH ₂ CH ₃	H	Cl	F	F
	A-251	H	H	CHF ₂	F	F
	A-252	F	H	CHF ₂	F	F
25	A-253	Cl	H	CHF ₂	F	F
	A-254	CH ₃	H	CHF ₂	F	F
	A-255	CH ₂ CH ₃	H	CHF ₂	F	F
	A-256	H	H	CF ₃	F	F
	A-257	F	H	CF ₃	F	F
30	A-258	Cl	H	CF ₃	F	F
	A-259	CH ₃	H	CF ₃	F	F
	A-260	CH ₂ CH ₃	H	CF ₃	F	F
	A-261	H	H	SCHF ₂	F	F
	A-262	F	H	SCHF ₂	F	F
35	A-263	Cl	H	SCHF ₂	F	F
	A-264	CH ₃	H	SCHF ₂	F	F
	A-265	CH ₂ CH ₃	H	SCHF ₂	F	F
	A-266	H	H	SCF ₃	F	F
	A-267	F	H	SCF ₃	F	F
40	A-268	Cl	H	SCF ₃	F	F
	A-269	CH ₃	H	SCF ₃	F	F
	A-270	CH ₂ CH ₃	H	SCF ₃	F	F
	A-271	H	H	OCHF ₂	F	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-272	F	H	OCHF ₂	F	F
A-273	Cl	H	OCHF ₂	F	F
5 A-274	CH ₃	H	OCHF ₂	F	F
A-275	CH ₂ CH ₃	H	OCHF ₂	F	F
A-276	H	H	OCF ₃	F	F
A-277	F	H	OCF ₃	F	F
10 A-278	Cl	H	OCF ₃	F	F
A-279	CH ₃	H	OCF ₃	F	F
A-280	CH ₂ CH ₃	H	OCF ₃	F	F
A-281	H	H	F	Cl	F
A-282	F	H	F	Cl	F
15 A-283	Cl	H	F	Cl	F
A-284	CH ₃	H	F	Cl	F
A-285	CH ₂ CH ₃	H	F	Cl	F
A-286	H	H	Cl	Cl	F
20 A-287	F	H	Cl	Cl	F
A-288	Cl	H	Cl	Cl	F
A-289	CH ₃	H	Cl	Cl	F
A-290	CH ₂ CH ₃	H	Cl	Cl	F
25 A-291	H	H	CHF ₂	Cl	F
A-292	F	H	CHF ₂	Cl	F
A-293	Cl	H	CHF ₂	Cl	F
A-294	CH ₃	H	CHF ₂	Cl	F
A-295	CH ₂ CH ₃	H	CHF ₂	Cl	F
30 A-296	H	H	CF ₃	Cl	F
A-297	F	H	CF ₃	Cl	F
A-298	Cl	H	CF ₃	Cl	F
A-299	CH ₃	H	CF ₃	Cl	F
35 A-300	CH ₂ CH ₃	H	CF ₃	Cl	F
A-301	H	H	SCHF ₂	Cl	F
A-302	F	H	SCHF ₂	Cl	F
A-303	Cl	H	SCHF ₂	Cl	F
40 A-304	CH ₃	H	SCHF ₂	Cl	F
A-305	CH ₂ CH ₃	H	SCHF ₂	Cl	F
A-306	H	H	SCF ₃	Cl	F
A-307	F	H	SCF ₃	Cl	F
45 A-308	Cl	H	SCF ₃	Cl	F
A-309	CH ₃	H	SCF ₃	Cl	F
A-310	CH ₂ CH ₃	H	SCF ₃	Cl	F

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-311	H	H	OCHF ₂	Cl	F
	A-312	F	H	OCHF ₂	Cl	F
	A-313	Cl	H	OCHF ₂	Cl	F
	A-314	CH ₃	H	OCHF ₂	Cl	F
	A-315	CH ₂ CH ₃	H	OCHF ₂	Cl	F
10	A-316	H	H	OCF ₃	Cl	F
	A-317	F	H	OCF ₃	Cl	F
	A-318	Cl	H	OCF ₃	Cl	F
	A-319	CH ₃	H	OCF ₃	Cl	F
	A-320	CH ₂ CH ₃	H	OCF ₃	Cl	F
15	A-321	H	H	F	CHF ₂	F
	A-322	F	H	F	CHF ₂	F
	A-323	Cl	H	F	CHF ₂	F
	A-324	CH ₃	H	F	CHF ₂	F
	A-325	CH ₂ CH ₃	H	F	CHF ₂	F
20	A-326	H	H	Cl	CHF ₂	F
	A-327	F	H	Cl	CHF ₂	F
	A-328	Cl	H	Cl	CHF ₂	F
	A-329	CH ₃	H	Cl	CHF ₂	F
	A-330	CH ₂ CH ₃	H	Cl	CHF ₂	F
25	A-331	H	H	CHF ₂	CHF ₂	F
	A-332	F	H	CHF ₂	CHF ₂	F
	A-333	Cl	H	CHF ₂	CHF ₂	F
	A-334	CH ₃	H	CHF ₂	CHF ₂	F
	A-335	CH ₂ CH ₃	H	CHF ₂	CHF ₂	F
30	A-336	H	H	CF ₃	CHF ₂	F
	A-337	F	H	CF ₃	CHF ₂	F
	A-338	Cl	H	CF ₃	CHF ₂	F
	A-339	CH ₃	H	CF ₃	CHF ₂	F
	A-340	CH ₂ CH ₃	H	CF ₃	CHF ₂	F
35	A-341	H	H	SCHF ₂	CHF ₂	F
	A-342	F	H	SCHF ₂	CHF ₂	F
	A-343	Cl	H	SCHF ₂	CHF ₂	F
	A-344	CH ₃	H	SCHF ₂	CHF ₂	F
	A-345	CH ₂ CH ₃	H	SCHF ₂	CHF ₂	F
40	A-346	H	H	SCF ₃	CHF ₂	F
	A-347	F	H	SCF ₃	CHF ₂	F
	A-348	Cl	H	SCF ₃	CHF ₂	F
	A-349	CH ₃	H	SCF ₃	CHF ₂	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-350	CH ₂ CH ₃	H	SCF ₃	CHF ₂	F
A-351	H	H	OCHF ₂	CHF ₂	F
5 A-352	F	H	OCHF ₂	CHF ₂	F
A-353	Cl	H	OCHF ₂	CHF ₂	F
A-354	CH ₃	H	OCHF ₂	CHF ₂	F
A-355	CH ₂ CH ₃	H	OCHF ₂	CHF ₂	F
10 A-356	H	H	OCF ₃	CHF ₂	F
A-357	F	H	OCF ₃	CHF ₂	F
A-358	Cl	H	OCF ₃	CHF ₂	F
A-359	CH ₃	H	OCF ₃	CHF ₂	F
A-360	CH ₂ CH ₃	H	OCF ₃	CHF ₂	F
15 A-361	H	H	F	CF ₃	F
A-362	F	H	F	CF ₃	F
A-363	Cl	H	F	CF ₃	F
A-364	CH ₃	H	F	CF ₃	F
20 A-365	CH ₂ CH ₃	H	F	CF ₃	F
A-366	H	H	Cl	CF ₃	F
A-367	F	H	Cl	CF ₃	F
A-368	Cl	H	Cl	CF ₃	F
25 A-369	CH ₃	H	Cl	CF ₃	F
A-370	CH ₂ CH ₃	H	Cl	CF ₃	F
A-371	H	H	CHF ₂	CF ₃	F
A-372	F	H	CHF ₂	CF ₃	F
A-373	Cl	H	CHF ₂	CF ₃	F
30 A-374	CH ₃	H	CHF ₂	CF ₃	F
A-375	CH ₂ CH ₃	H	CHF ₂	CF ₃	F
A-376	H	H	CF ₃	CF ₃	F
A-377	F	H	CF ₃	CF ₃	F
35 A-378	Cl	H	CF ₃	CF ₃	F
A-379	CH ₃	H	CF ₃	CF ₃	F
A-380	CH ₂ CH ₃	H	CF ₃	CF ₃	F
A-381	H	H	SCHF ₂	CF ₃	F
40 A-382	F	H	SCHF ₂	CF ₃	F
A-383	Cl	H	SCHF ₂	CF ₃	F
A-384	CH ₃	H	SCHF ₂	CF ₃	F
A-385	CH ₂ CH ₃	H	SCHF ₂	CF ₃	F
45 A-386	H	H	SCF ₃	CF ₃	F
A-387	F	H	SCF ₃	CF ₃	F
A-388	Cl	H	SCF ₃	CF ₃	F

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-389	CH ₃	H	SCF ₃	CF ₃	F
A-390	CH ₂ CH ₃	H	SCF ₃	CF ₃	F
5 A-391	H	H	OCHF ₂	CF ₃	F
A-392	F	H	OCHF ₂	CF ₃	F
A-393	Cl	H	OCHF ₂	CF ₃	F
A-394	CH ₃	H	OCHF ₂	CF ₃	F
10 A-395	CH ₂ CH ₃	H	OCHF ₂	CF ₃	F
A-396	H	H	OCF ₃	CF ₃	F
A-397	F	H	OCF ₃	CF ₃	F
A-398	Cl	H	OCF ₃	CF ₃	F
A-399	CH ₃	H	OCF ₃	CF ₃	F
15 A-400	CH ₂ CH ₃	H	OCF ₃	CF ₃	F
A-401	H	H	F	H	Cl
A-402	F	H	F	H	Cl
A-403	Cl	H	F	H	Cl
20 A-404	CH ₃	H	F	H	Cl
A-405	CH ₂ CH ₃	H	F	H	Cl
A-406	H	H	Cl	H	Cl
A-407	F	H	Cl	H	Cl
25 A-408	Cl	H	Cl	H	Cl
A-409	CH ₃	H	Cl	H	Cl
A-410	CH ₂ CH ₃	H	Cl	H	Cl
A-411	H	H	CHF ₂	H	Cl
30 A-412	F	H	CHF ₂	H	Cl
A-413	Cl	H	CHF ₂	H	Cl
A-414	CH ₃	H	CHF ₂	H	Cl
A-415	CH ₂ CH ₃	H	CHF ₂	H	Cl
A-416	H	H	CF ₃	H	Cl
35 A-417	F	H	CF ₃	H	Cl
A-418	Cl	H	CF ₃	H	Cl
A-419	CH ₃	H	CF ₃	H	Cl
A-420	CH ₂ CH ₃	H	CF ₃	H	Cl
40 A-421	H	H	SCHF ₂	H	Cl
A-422	F	H	SCHF ₂	H	Cl
A-423	Cl	H	SCHF ₂	H	Cl
A-424	CH ₃	H	SCHF ₂	H	Cl
45 A-425	CH ₂ CH ₃	H	SCHF ₂	H	Cl
A-426	H	H	SCF ₃	H	Cl
A-427	F	H	SCF ₃	H	Cl

50

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-428	Cl	H	SCF ₃	H	Cl
	A-429	CH ₃	H	SCF ₃	H	Cl
	A-430	CH ₂ CH ₃	H	SCF ₃	H	Cl
	A-431	H	H	OCHF ₂	H	Cl
	A-432	F	H	OCHF ₂	H	Cl
10	A-433	Cl	H	OCHF ₂	H	Cl
	A-434	CH ₃	H	OCHF ₂	H	Cl
	A-435	CH ₂ CH ₃	H	OCHF ₂	H	Cl
	A-436	H	H	OCF ₃	H	Cl
	A-437	F	H	OCF ₃	H	Cl
15	A-438	Cl	H	OCF ₃	H	Cl
	A-439	CH ₃	H	OCF ₃	H	Cl
	A-440	CH ₂ CH ₃	H	OCF ₃	H	Cl
	A-441	H	H	F	F	Cl
	A-442	F	H	F	F	Cl
20	A-443	Cl	H	F	F	Cl
	A-444	CH ₃	H	F	F	Cl
	A-445	CH ₂ CH ₃	H	F	F	Cl
	A-446	H	H	Cl	F	Cl
	A-447	F	H	Cl	F	Cl
25	A-448	Cl	H	Cl	F	Cl
	A-449	CH ₃	H	Cl	F	Cl
	A-450	CH ₂ CH ₃	H	Cl	F	Cl
	A-451	H	H	CHF ₂	F	Cl
	A-452	F	H	CHF ₂	F	Cl
30	A-453	Cl	H	CHF ₂	F	Cl
	A-454	CH ₃	H	CHF ₂	F	Cl
	A-455	CH ₂ CH ₃	H	CHF ₂	F	Cl
	A-456	H	H	CF ₃	F	Cl
	A-457	F	H	CF ₃	F	Cl
35	A-458	Cl	H	CF ₃	F	Cl
	A-459	CH ₃	H	CF ₃	F	Cl
	A-460	CH ₂ CH ₃	H	CF ₃	F	Cl
	A-461	H	H	SCHF ₂	F	Cl
	A-462	F	H	SCHF ₂	F	Cl
40	A-463	Cl	H	SCHF ₂	F	Cl
	A-464	CH ₃	H	SCHF ₂	F	Cl
	A-465	CH ₂ CH ₃	H	SCHF ₂	F	Cl
	A-466	H	H	SCF ₃	F	Cl
	45					

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-467	F	H	SCF ₃	F	Cl
A-468	Cl	H	SCF ₃	F	Cl
5 A-469	CH ₃	H	SCF ₃	F	Cl
A-470	CH ₂ CH ₃	H	SCF ₃	F	Cl
A-471	H	H	OCHF ₂	F	Cl
A-472	F	H	OCHF ₂	F	Cl
10 A-473	Cl	H	OCHF ₂	F	Cl
A-474	CH ₃	H	OCHF ₂	F	Cl
A-475	CH ₂ CH ₃	H	OCHF ₂	F	Cl
A-476	H	H	OCF ₃	F	Cl
A-477	F	H	OCF ₃	F	Cl
15 A-478	Cl	H	OCF ₃	F	Cl
A-479	CH ₃	H	OCF ₃	F	Cl
A-480	CH ₂ CH ₃	H	OCF ₃	F	Cl
A-481	H	H	F	Cl	Cl
20 A-482	F	H	F	Cl	Cl
A-483	Cl	H	F	Cl	Cl
A-484	CH ₃	H	F	Cl	Cl
A-485	CH ₂ CH ₃	H	F	Cl	Cl
25 A-486	H	H	Cl	Cl	Cl
A-487	F	H	Cl	Cl	Cl
A-488	Cl	H	Cl	Cl	Cl
A-489	CH ₃	H	Cl	Cl	Cl
30 A-490	CH ₂ CH ₃	H	Cl	Cl	Cl
A-491	H	H	CHF ₂	Cl	Cl
A-492	F	H	CHF ₂	Cl	Cl
A-493	Cl	H	CHF ₂	Cl	Cl
A-494	CH ₃	H	CHF ₂	Cl	Cl
35 A-495	CH ₂ CH ₃	H	CHF ₂	Cl	Cl
A-496	H	H	CF ₃	Cl	Cl
A-497	F	H	CF ₃	Cl	Cl
A-498	Cl	H	CF ₃	Cl	Cl
40 A-499	CH ₃	H	CF ₃	Cl	Cl
A-500	CH ₂ CH ₃	H	CF ₃	Cl	Cl
A-501	H	H	SCHF ₂	Cl	Cl
A-502	F	H	SCHF ₂	Cl	Cl
45 A-503	Cl	H	SCHF ₂	Cl	Cl
A-504	CH ₃	H	SCHF ₂	Cl	Cl
A-505	CH ₂ CH ₃	H	SCHF ₂	Cl	Cl

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-506	H	H	SCF ₃	Cl	Cl
A-507	F	H	SCF ₃	Cl	Cl
5 A-508	Cl	H	SCF ₃	Cl	Cl
A-509	CH ₃	H	SCF ₃	Cl	Cl
A-510	CH ₂ CH ₃	H	SCF ₃	Cl	Cl
A-511	H	H	OCHF ₂	Cl	Cl
10 A-512	F	H	OCHF ₂	Cl	Cl
A-513	Cl	H	OCHF ₂	Cl	Cl
A-514	CH ₃	H	OCHF ₂	Cl	Cl
A-515	CH ₂ CH ₃	H	OCHF ₂	Cl	Cl
A-516	H	H	OCF ₃	Cl	Cl
15 A-517	F	H	OCF ₃	Cl	Cl
A-518	Cl	H	OCF ₃	Cl	Cl
A-519	CH ₃	H	OCF ₃	Cl	Cl
A-520	CH ₂ CH ₃	H	OCF ₃	Cl	Cl
20 A-521	H	H	F	CHF ₂	Cl
A-522	F	H	F	CHF ₂	Cl
A-523	Cl	H	F	CHF ₂	Cl
A-524	CH ₃	H	F	CHF ₂	Cl
25 A-525	CH ₂ CH ₃	H	F	CHF ₂	Cl
A-526	H	H	Cl	CHF ₂	Cl
A-527	F	H	Cl	CHF ₂	Cl
A-528	Cl	H	Cl	CHF ₂	Cl
A-529	CH ₃	H	Cl	CHF ₂	Cl
30 A-530	CH ₂ CH ₃	H	Cl	CHF ₂	Cl
A-531	H	H	CHF ₂	CHF ₂	Cl
A-532	F	H	CHF ₂	CHF ₂	Cl
A-533	Cl	H	CHF ₂	CHF ₂	Cl
35 A-534	CH ₃	H	CHF ₂	CHF ₂	Cl
A-535	CH ₂ CH ₃	H	CHF ₂	CHF ₂	Cl
A-536	H	H	CF ₃	CHF ₂	Cl
A-537	F	H	CF ₃	CHF ₂	Cl
40 A-538	Cl	H	CF ₃	CHF ₂	Cl
A-539	CH ₃	H	CF ₃	CHF ₂	Cl
A-540	CH ₂ CH ₃	H	CF ₃	CHF ₂	Cl
A-541	H	H	SCHF ₂	CHF ₂	Cl
45 A-542	F	H	SCHF ₂	CHF ₂	Cl
A-543	Cl	H	SCHF ₂	CHF ₂	Cl
A-544	CH ₃	H	SCHF ₂	CHF ₂	Cl

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	No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
5	A-545	CH ₂ CH ₃	H	SCHF ₂	CHF ₂	Cl
	A-546	H	H	SCF ₃	CHF ₂	Cl
	A-547	F	H	SCF ₃	CHF ₂	Cl
	A-548	Cl	H	SCF ₃	CHF ₂	Cl
	A-549	CH ₃	H	SCF ₃	CHF ₂	Cl
10	A-550	CH ₂ CH ₃	H	SCF ₃	CHF ₂	Cl
	A-551	H	H	OCHF ₂	CHF ₂	Cl
	A-552	F	H	OCHF ₂	CHF ₂	Cl
	A-553	Cl	H	OCHF ₂	CHF ₂	Cl
	A-554	CH ₃	H	OCHF ₂	CHF ₂	Cl
15	A-555	CH ₂ CH ₃	H	OCHF ₂	CHF ₂	Cl
	A-556	H	H	OCF ₃	CHF ₂	Cl
	A-557	F	H	OCF ₃	CHF ₂	Cl
	A-558	Cl	H	OCF ₃	CHF ₂	Cl
	A-559	CH ₃	H	OCF ₃	CHF ₂	Cl
20	A-560	CH ₂ CH ₃	H	OCF ₃	CHF ₂	Cl
	A-561	H	H	F	CF ₃	Cl
	A-562	F	H	F	CF ₃	Cl
	A-563	Cl	H	F	CF ₃	Cl
	A-564	CH ₃	H	F	CF ₃	Cl
25	A-565	CH ₂ CH ₃	H	F	CF ₃	Cl
	A-566	H	H	Cl	CF ₃	Cl
	A-567	F	H	Cl	CF ₃	Cl
	A-568	Cl	H	Cl	CF ₃	Cl
	A-569	CH ₃	H	Cl	CF ₃	Cl
30	A-570	CH ₂ CH ₃	H	Cl	CF ₃	Cl
	A-571	H	H	CHF ₂	CF ₃	Cl
	A-572	F	H	CHF ₂	CF ₃	Cl
	A-573	Cl	H	CHF ₂	CF ₃	Cl
	A-574	CH ₃	H	CHF ₂	CF ₃	Cl
35	A-575	CH ₂ CH ₃	H	CHF ₂	CF ₃	Cl
	A-576	H	H	CF ₃	CF ₃	Cl
	A-577	F	H	CF ₃	CF ₃	Cl
	A-578	Cl	H	CF ₃	CF ₃	Cl
	A-579	CH ₃	H	CF ₃	CF ₃	Cl
40	A-580	CH ₂ CH ₃	H	CF ₃	CF ₃	Cl
	A-581	H	H	SCHF ₂	CF ₃	Cl
	A-582	F	H	SCHF ₂	CF ₃	Cl
	A-583	Cl	H	SCHF ₂	CF ₃	Cl
45						

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-584	CH ₃	H	SCHF ₂	CF ₃	Cl
A-585	CH ₂ CH ₃	H	SCHF ₂	CF ₃	Cl
A-586	H	H	SCF ₃	CF ₃	Cl
A-587	F	H	SCF ₃	CF ₃	Cl
A-588	Cl	H	SCF ₃	CF ₃	Cl
A-589	CH ₃	H	SCF ₃	CF ₃	Cl
A-590	CH ₂ CH ₃	H	SCF ₃	CF ₃	Cl
A-591	H	H	OCHF ₂	CF ₃	Cl
A-592	F	H	OCHF ₂	CF ₃	Cl
A-593	Cl	H	OCHF ₂	CF ₃	Cl
A-594	CH ₃	H	OCHF ₂	CF ₃	Cl
A-595	CH ₂ CH ₃	H	OCHF ₂	CF ₃	Cl
A-596	H	H	OCF ₃	CF ₃	Cl
A-597	F	H	OCF ₃	CF ₃	Cl
A-598	Cl	H	OCF ₃	CF ₃	Cl
A-599	CH ₃	H	OCF ₃	CF ₃	Cl
A-600	CH ₂ CH ₃	H	OCF ₃	CF ₃	Cl
A-601	H	F	F	H	H
A-602	F	F	F	H	H
A-603	Cl	F	F	H	H
A-604	CH ₃	F	F	H	H
A-605	CH ₂ CH ₃	F	F	H	H
A-606	H	F	Cl	H	H
A-607	F	F	Cl	H	H
A-608	Cl	F	Cl	H	H
A-609	CH ₃	F	Cl	H	H
A-610	CH ₂ CH ₃	F	Cl	H	H
A-611	H	F	CHF ₂	H	H
A-612	F	F	CHF ₂	H	H
A-613	Cl	F	CHF ₂	H	H
A-614	CH ₃	F	CHF ₂	H	H
A-615	CH ₂ CH ₃	F	CHF ₂	H	H
A-616	H	F	CF ₃	H	H
A-617	F	F	CF ₃	H	H
A-618	Cl	F	CF ₃	H	H
A-619	CH ₃	F	CF ₃	H	H
A-620	CH ₂ CH ₃	F	CF ₃	H	H
A-621	H	F	SCHF ₂	H	H
A-622	F	F	SCHF ₂	H	H

55

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-623	Cl	F	SCHF ₂	H	H
A-624	CH ₃	F	SCHF ₂	H	H
5 A-625	CH ₂ CH ₃	F	SCHF ₂	H	H
A-626	H	F	SCF ₃	H	H
A-627	F	F	SCF ₃	H	H
A-628	Cl	F	SCF ₃	H	H
A-629	CH ₃	F	SCF ₃	H	H
10 A-630	CH ₂ CH ₃	F	SCF ₃	H	H
A-631	H	F	OCHF ₂	H	H
A-632	F	F	OCHF ₂	H	H
A-633	Cl	F	OCHF ₂	H	H
15 A-634	CH ₃	F	OCHF ₂	H	H
A-635	CH ₂ CH ₃	F	OCHF ₂	H	H
A-636	H	F	OCF ₃	H	H
A-637	F	F	OCF ₃	H	H
20 A-638	Cl	F	OCF ₃	H	H
A-639	CH ₃	F	OCF ₃	H	H
A-640	CH ₂ CH ₃	F	OCF ₃	H	H
A-641	H	F	F	F	H
25 A-642	F	F	F	F	H
A-643	Cl	F	F	F	H
A-644	CH ₃	F	F	F	H
A-645	CH ₂ CH ₃	F	F	F	H
A-646	H	F	Cl	F	H
30 A-647	F	F	Cl	F	H
A-648	Cl	F	Cl	F	H
A-649	CH ₃	F	Cl	F	H
A-650	CH ₂ CH ₃	F	Cl	F	H
35 A-651	H	F	CHF ₂	F	H
A-652	F	F	CHF ₂	F	H
A-653	Cl	F	CHF ₂	F	H
A-654	CH ₃	F	CHF ₂	F	H
40 A-655	CH ₂ CH ₃	F	CHF ₂	F	H
A-656	H	F	CF ₃	F	H
A-657	F	F	CF ₃	F	H
A-658	Cl	F	CF ₃	F	H
A-659	CH ₃	F	CF ₃	F	H
45 A-660	CH ₂ CH ₃	F	CF ₃	F	H
A-661	H	F	SCHF ₂	F	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-662	F	F	SCHF ₂	F	H
A-663	Cl	F	SCHF ₂	F	H
5 A-664	CH ₃	F	SCHF ₂	F	H
A-665	CH ₂ CH ₃	F	SCHF ₂	F	H
A-666	H	F	SCF ₃	F	H
A-667	F	F	SCF ₃	F	H
10 A-668	Cl	F	SCF ₃	F	H
A-669	CH ₃	F	SCF ₃	F	H
A-670	CH ₂ CH ₃	F	SCF ₃	F	H
A-671	H	F	OCHF ₂	F	H
A-672	F	F	OCHF ₂	F	H
15 A-673	Cl	F	OCHF ₂	F	H
A-674	CH ₃	F	OCHF ₂	F	H
A-675	CH ₂ CH ₃	F	OCHF ₂	F	H
A-676	H	F	OCF ₃	F	H
20 A-677	F	F	OCF ₃	F	H
A-678	Cl	F	OCF ₃	F	H
A-679	CH ₃	F	OCF ₃	F	H
A-680	CH ₂ CH ₃	F	OCF ₃	F	H
25 A-681	H	F	F	Cl	H
A-682	F	F	F	Cl	H
A-683	Cl	F	F	Cl	H
A-684	CH ₃	F	F	Cl	H
A-685	CH ₂ CH ₃	F	F	Cl	H
30 A-686	H	F	Cl	Cl	H
A-687	F	F	Cl	Cl	H
A-688	Cl	F	Cl	Cl	H
A-689	CH ₃	F	Cl	Cl	H
35 A-690	CH ₂ CH ₃	F	Cl	Cl	H
A-691	H	F	CHF ₂	Cl	H
A-692	F	F	CHF ₂	Cl	H
A-693	Cl	F	CHF ₂	Cl	H
40 A-694	CH ₃	F	CHF ₂	Cl	H
A-695	CH ₂ CH ₃	F	CHF ₂	Cl	H
A-696	H	F	CF ₃	Cl	H
A-697	F	F	CF ₃	Cl	H
A-698	Cl	F	CF ₃	Cl	H
45 A-699	CH ₃	F	CF ₃	Cl	H
A-700	CH ₂ CH ₃	F	CF ₃	Cl	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-701	H	F	SCHF ₂	Cl	H
A-702	F	F	SCHF ₂	Cl	H
5 A-703	Cl	F	SCHF ₂	Cl	H
A-704	CH ₃	F	SCHF ₂	Cl	H
A-705	CH ₂ CH ₃	F	SCHF ₂	Cl	H
A-706	H	F	SCF ₃	Cl	H
10 A-707	F	F	SCF ₃	Cl	H
A-708	Cl	F	SCF ₃	Cl	H
A-709	CH ₃	F	SCF ₃	Cl	H
A-710	CH ₂ CH ₃	F	SCF ₃	Cl	H
A-711	H	F	OCHF ₂	Cl	H
15 A-712	F	F	OCHF ₂	Cl	H
A-713	Cl	F	OCHF ₂	Cl	H
A-714	CH ₃	F	OCHF ₂	Cl	H
A-715	CH ₂ CH ₃	F	OCHF ₂	Cl	H
20 A-716	H	F	OCF ₃	Cl	H
A-717	F	F	OCF ₃	Cl	H
A-718	Cl	F	OCF ₃	Cl	H
A-719	CH ₃	F	OCF ₃	Cl	H
25 A-720	CH ₂ CH ₃	F	OCF ₃	Cl	H
A-721	H	F	F	CHF ₂	H
A-722	F	F	F	CHF ₂	H
A-723	Cl	F	F	CHF ₂	H
30 A-724	CH ₃	F	F	CHF ₂	H
A-725	CH ₂ CH ₃	F	F	CHF ₂	H
A-726	H	F	Cl	CHF ₂	H
A-727	F	F	Cl	CHF ₂	H
A-728	Cl	F	Cl	CHF ₂	H
35 A-729	CH ₃	F	Cl	CHF ₂	H
A-730	CH ₂ CH ₃	F	Cl	CHF ₂	H
A-731	H	F	CHF ₂	CHF ₂	H
A-732	F	F	CHF ₂	CHF ₂	H
40 A-733	Cl	F	CHF ₂	CHF ₂	H
A-734	CH ₃	F	CHF ₂	CHF ₂	H
A-735	CH ₂ CH ₃	F	CHF ₂	CHF ₂	H
A-736	H	F	CF ₃	CHF ₂	H
45 A-737	F	F	CF ₃	CHF ₂	H
A-738	Cl	F	CF ₃	CHF ₂	H
A-739	CH ₃	F	CF ₃	CHF ₂	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-740	CH ₂ CH ₃	F	CF ₃	CHF ₂	H
A-741	H	F	SCHF ₂	CHF ₂	H
5 A-742	F	F	SCHF ₂	CHF ₂	H
A-743	Cl	F	SCHF ₂	CHF ₂	H
A-744	CH ₃	F	SCHF ₂	CHF ₂	H
A-745	CH ₂ CH ₃	F	SCHF ₂	CHF ₂	H
10 A-746	H	F	SCF ₃	CHF ₂	H
A-747	F	F	SCF ₃	CHF ₂	H
A-748	Cl	F	SCF ₃	CHF ₂	H
A-749	CH ₃	F	SCF ₃	CHF ₂	H
A-750	CH ₂ CH ₃	F	SCF ₃	CHF ₂	H
15 A-751	H	F	OCHF ₂	CHF ₂	H
A-752	F	F	OCHF ₂	CHF ₂	H
A-753	Cl	F	OCHF ₂	CHF ₂	H
A-754	CH ₃	F	OCHF ₂	CHF ₂	H
20 A-755	CH ₂ CH ₃	F	OCHF ₂	CHF ₂	H
A-756	H	F	OCF ₃	CHF ₂	H
A-757	F	F	OCF ₃	CHF ₂	H
A-758	Cl	F	OCF ₃	CHF ₂	H
25 A-759	CH ₃	F	OCF ₃	CHF ₂	H
A-760	CH ₂ CH ₃	F	OCF ₃	CHF ₂	H
A-761	H	F	F	CF ₃	H
A-762	F	F	F	CF ₃	H
A-763	Cl	F	F	CF ₃	H
30 A-764	CH ₃	F	F	CF ₃	H
A-765	CH ₂ CH ₃	F	F	CF ₃	H
A-766	H	F	Cl	CF ₃	H
A-767	F	F	Cl	CF ₃	H
35 A-768	Cl	F	Cl	CF ₃	H
A-769	CH ₃	F	Cl	CF ₃	H
A-770	CH ₂ CH ₃	F	Cl	CF ₃	H
A-771	H	F	CHF ₂	CF ₃	H
40 A-772	F	F	CHF ₂	CF ₃	H
A-773	Cl	F	CHF ₂	CF ₃	H
A-774	CH ₃	F	CHF ₂	CF ₃	H
A-775	CH ₂ CH ₃	F	CHF ₂	CF ₃	H
45 A-776	H	F	CF ₃	CF ₃	H
A-777	F	F	CF ₃	CF ₃	H
A-778	Cl	F	CF ₃	CF ₃	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-779	CH ₃	F	CF ₃	CF ₃	H
A-780	CH ₂ CH ₃	F	CF ₃	CF ₃	H
5 A-781	H	F	SCHF ₂	CF ₃	H
A-782	F	F	SCHF ₂	CF ₃	H
A-783	Cl	F	SCHF ₂	CF ₃	H
A-784	CH ₃	F	SCHF ₂	CF ₃	H
A-785	CH ₂ CH ₃	F	SCHF ₂	CF ₃	H
10 A-786	H	F	SCF ₃	CF ₃	H
A-787	F	F	SCF ₃	CF ₃	H
A-788	Cl	F	SCF ₃	CF ₃	H
A-789	CH ₃	F	SCF ₃	CF ₃	H
15 A-790	CH ₂ CH ₃	F	SCF ₃	CF ₃	H
A-791	H	F	OCHF ₂	CF ₃	H
A-792	F	F	OCHF ₂	CF ₃	H
A-793	Cl	F	OCHF ₂	CF ₃	H
20 A-794	CH ₃	F	OCHF ₂	CF ₃	H
A-795	CH ₂ CH ₃	F	OCHF ₂	CF ₃	H
A-796	H	F	OCF ₃	CF ₃	H
A-797	F	F	OCF ₃	CF ₃	H
A-798	Cl	F	OCF ₃	CF ₃	H
25 A-799	CH ₃	F	OCF ₃	CF ₃	H
A-800	CH ₂ CH ₃	F	OCF ₃	CF ₃	H
A-801	H	F	F	H	F
A-802	F	F	F	H	F
30 A-803	Cl	F	F	H	F
A-804	CH ₃	F	F	H	F
A-805	CH ₂ CH ₃	F	F	H	F
A-806	H	F	Cl	H	F
35 A-807	F	F	Cl	H	F
A-808	Cl	F	Cl	H	F
A-809	CH ₃	F	Cl	H	F
A-810	CH ₂ CH ₃	F	Cl	H	F
40 A-811	H	F	CHF ₂	H	F
A-812	F	F	CHF ₂	H	F
A-813	Cl	F	CHF ₂	H	F
A-814	CH ₃	F	CHF ₂	H	F
A-815	CH ₂ CH ₃	F	CHF ₂	H	F
45 A-816	H	F	CF ₃	H	F
A-817	F	F	CF ₃	H	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-818	Cl	F	CF ₃	H	F
	A-819	CH ₃	F	CF ₃	H	F
	A-820	CH ₂ CH ₃	F	CF ₃	H	F
	A-821	H	F	SCHF ₂	H	F
	A-822	F	F	SCHF ₂	H	F
10	A-823	Cl	F	SCHF ₂	H	F
	A-824	CH ₃	F	SCHF ₂	H	F
	A-825	CH ₂ CH ₃	F	SCHF ₂	H	F
	A-826	H	F	SCF ₃	H	F
	A-827	F	F	SCF ₃	H	F
15	A-828	Cl	F	SCF ₃	H	F
	A-829	CH ₃	F	SCF ₃	H	F
	A-830	CH ₂ CH ₃	F	SCF ₃	H	F
	A-831	H	F	OCHF ₂	H	F
	A-832	F	F	OCHF ₂	H	F
20	A-833	Cl	F	OCHF ₂	H	F
	A-834	CH ₃	F	OCHF ₂	H	F
	A-835	CH ₂ CH ₃	F	OCHF ₂	H	F
	A-836	H	F	OCF ₃	H	F
	A-837	F	F	OCF ₃	H	F
25	A-838	Cl	F	OCF ₃	H	F
	A-839	CH ₃	F	OCF ₃	H	F
	A-840	CH ₂ CH ₃	F	OCF ₃	H	F
	A-841	H	F	F	F	F
	A-842	F	F	F	F	F
30	A-843	Cl	F	F	F	F
	A-844	CH ₃	F	F	F	F
	A-845	CH ₂ CH ₃	F	F	F	F
	A-846	H	F	Cl	F	F
	A-847	F	F	Cl	F	F
35	A-848	Cl	F	Cl	F	F
	A-849	CH ₃	F	Cl	F	F
	A-850	CH ₂ CH ₃	F	Cl	F	F
	A-851	H	F	CHF ₂	F	F
	A-852	F	F	CHF ₂	F	F
40	A-853	Cl	F	CHF ₂	F	F
	A-854	CH ₃	F	CHF ₂	F	F
	A-855	CH ₂ CH ₃	F	CHF ₂	F	F
	A-856	H	F	CF ₃	F	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-857	F	F	CF ₃	F	F
A-858	Cl	F	CF ₃	F	F
5 A-859	CH ₃	F	CF ₃	F	F
A-860	CH ₂ CH ₃	F	CF ₃	F	F
A-861	H	F	SCHF ₂	F	F
A-862	F	F	SCHF ₂	F	F
A-863	Cl	F	SCHF ₂	F	F
10 A-864	CH ₃	F	SCHF ₂	F	F
A-865	CH ₂ CH ₃	F	SCHF ₂	F	F
A-866	H	F	SCF ₃	F	F
A-867	F	F	SCF ₃	F	F
15 A-868	Cl	F	SCF ₃	F	F
A-869	CH ₃	F	SCF ₃	F	F
A-870	CH ₂ CH ₃	F	SCF ₃	F	F
A-871	H	F	OCHF ₂	F	F
20 A-872	F	F	OCHF ₂	F	F
A-873	Cl	F	OCHF ₂	F	F
A-874	CH ₃	F	OCHF ₂	F	F
A-875	CH ₂ CH ₃	F	OCHF ₂	F	F
25 A-876	H	F	OCF ₃	F	F
A-877	F	F	OCF ₃	F	F
A-878	Cl	F	OCF ₃	F	F
A-879	CH ₃	F	OCF ₃	F	F
A-880	CH ₂ CH ₃	F	OCF ₃	F	F
30 A-881	H	F	F	Cl	F
A-882	F	F	F	Cl	F
A-883	Cl	F	F	Cl	F
A-884	CH ₃	F	F	Cl	F
35 A-885	CH ₂ CH ₃	F	F	Cl	F
A-886	H	F	Cl	Cl	F
A-887	F	F	Cl	Cl	F
A-888	Cl	F	Cl	Cl	F
40 A-889	CH ₃	F	Cl	Cl	F
A-890	CH ₂ CH ₃	F	Cl	Cl	F
A-891	H	F	CHF ₂	Cl	F
A-892	F	F	CHF ₂	Cl	F
45 A-893	Cl	F	CHF ₂	Cl	F
A-894	CH ₃	F	CHF ₂	Cl	F
A-895	CH ₂ CH ₃	F	CHF ₂	Cl	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-896	H	F	CF ₃	Cl	F
	A-897	F	F	CF ₃	Cl	F
	A-898	Cl	F	CF ₃	Cl	F
	A-899	CH ₃	F	CF ₃	Cl	F
	A-900	CH ₂ CH ₃	F	CF ₃	Cl	F
10	A-901	H	F	SCHF ₂	Cl	F
	A-902	F	F	SCHF ₂	Cl	F
	A-903	Cl	F	SCHF ₂	Cl	F
	A-904	CH ₃	F	SCHF ₂	Cl	F
	A-905	CH ₂ CH ₃	F	SCHF ₂	Cl	F
15	A-906	H	F	SCF ₃	Cl	F
	A-907	F	F	SCF ₃	Cl	F
	A-908	Cl	F	SCF ₃	Cl	F
	A-909	CH ₃	F	SCF ₃	Cl	F
	A-910	CH ₂ CH ₃	F	SCF ₃	Cl	F
20	A-911	H	F	OCHF ₂	Cl	F
	A-912	F	F	OCHF ₂	Cl	F
	A-913	Cl	F	OCHF ₂	Cl	F
	A-914	CH ₃	F	OCHF ₂	Cl	F
	A-915	CH ₂ CH ₃	F	OCHF ₂	Cl	F
25	A-916	H	F	OCF ₃	Cl	F
	A-917	F	F	OCF ₃	Cl	F
	A-918	Cl	F	OCF ₃	Cl	F
	A-919	CH ₃	F	OCF ₃	Cl	F
	A-920	CH ₂ CH ₃	F	OCF ₃	Cl	F
30	A-921	H	F	F	CHF ₂	F
	A-922	F	F	F	CHF ₂	F
	A-923	Cl	F	F	CHF ₂	F
	A-924	CH ₃	F	F	CHF ₂	F
	A-925	CH ₂ CH ₃	F	F	CHF ₂	F
35	A-926	H	F	Cl	CHF ₂	F
	A-927	F	F	Cl	CHF ₂	F
	A-928	Cl	F	Cl	CHF ₂	F
	A-929	CH ₃	F	Cl	CHF ₂	F
	A-930	CH ₂ CH ₃	F	Cl	CHF ₂	F
40	A-931	H	F	CHF ₂	CHF ₂	F
	A-932	F	F	CHF ₂	CHF ₂	F
	A-933	Cl	F	CHF ₂	CHF ₂	F
	A-934	CH ₃	F	CHF ₂	CHF ₂	F
	45	A-934	CH ₃	F	CHF ₂	CHF ₂

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-935	CH ₂ CH ₃	F	CHF ₂	CHF ₂	F
A-936	H	F	CF ₃	CHF ₂	F
5 A-937	F	F	CF ₃	CHF ₂	F
A-938	Cl	F	CF ₃	CHF ₂	F
A-939	CH ₃	F	CF ₃	CHF ₂	F
A-940	CH ₂ CH ₃	F	CF ₃	CHF ₂	F
10 A-941	H	F	SCHF ₂	CHF ₂	F
A-942	F	F	SCHF ₂	CHF ₂	F
A-943	Cl	F	SCHF ₂	CHF ₂	F
A-944	CH ₃	F	SCHF ₂	CHF ₂	F
A-945	CH ₂ CH ₃	F	SCHF ₂	CHF ₂	F
15 A-946	H	F	SCF ₃	CHF ₂	F
A-947	F	F	SCF ₃	CHF ₂	F
A-948	Cl	F	SCF ₃	CHF ₂	F
A-949	CH ₃	F	SCF ₃	CHF ₂	F
20 A-950	CH ₂ CH ₃	F	SCF ₃	CHF ₂	F
A-951	H	F	OCHF ₂	CHF ₂	F
A-952	F	F	OCHF ₂	CHF ₂	F
A-953	Cl	F	OCHF ₂	CHF ₂	F
25 A-954	CH ₃	F	OCHF ₂	CHF ₂	F
A-955	CH ₂ CH ₃	F	OCHF ₂	CHF ₂	F
A-956	H	F	OCF ₃	CHF ₂	F
A-957	F	F	OCF ₃	CHF ₂	F
A-958	Cl	F	OCF ₃	CHF ₂	F
30 A-959	CH ₃	F	OCF ₃	CHF ₂	F
A-960	CH ₂ CH ₃	F	OCF ₃	CHF ₂	F
A-961	H	F	F	CF ₃	F
A-962	F	F	F	CF ₃	F
35 A-963	Cl	F	F	CF ₃	F
A-964	CH ₃	F	F	CF ₃	F
A-965	CH ₂ CH ₃	F	F	CF ₃	F
A-966	H	F	Cl	CF ₃	F
40 A-967	F	F	Cl	CF ₃	F
A-968	Cl	F	Cl	CF ₃	F
A-969	CH ₃	F	Cl	CF ₃	F
A-970	CH ₂ CH ₃	F	Cl	CF ₃	F
45 A-971	H	F	CHF ₂	CF ₃	F
A-972	F	F	CHF ₂	CF ₃	F
A-973	Cl	F	CHF ₂	CF ₃	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-974	CH ₃	F	CHF ₂	CF ₃	F
	A-975	CH ₂ CH ₃	F	CHF ₂	CF ₃	F
	A-976	H	F	CF ₃	CF ₃	F
	A-977	F	F	CF ₃	CF ₃	F
	A-978	Cl	F	CF ₃	CF ₃	F
10	A-979	CH ₃	F	CF ₃	CF ₃	F
	A-980	CH ₂ CH ₃	F	CF ₃	CF ₃	F
	A-981	H	F	SCHF ₂	CF ₃	F
	A-982	F	F	SCHF ₂	CF ₃	F
	A-983	Cl	F	SCHF ₂	CF ₃	F
15	A-984	CH ₃	F	SCHF ₂	CF ₃	F
	A-985	CH ₂ CH ₃	F	SCHF ₂	CF ₃	F
	A-986	H	F	SCF ₃	CF ₃	F
	A-987	F	F	SCF ₃	CF ₃	F
	A-988	Cl	F	SCF ₃	CF ₃	F
20	A-989	CH ₃	F	SCF ₃	CF ₃	F
	A-990	CH ₂ CH ₃	F	SCF ₃	CF ₃	F
	A-991	H	F	OCHF ₂	CF ₃	F
	A-992	F	F	OCHF ₂	CF ₃	F
	A-993	Cl	F	OCHF ₂	CF ₃	F
25	A-994	CH ₃	F	OCHF ₂	CF ₃	F
	A-995	CH ₂ CH ₃	F	OCHF ₂	CF ₃	F
	A-996	H	F	OCF ₃	CF ₃	F
	A-997	F	F	OCF ₃	CF ₃	F
	A-998	Cl	F	OCF ₃	CF ₃	F
30	A-999	CH ₃	F	OCF ₃	CF ₃	F
	A-1000	CH ₂ CH ₃	F	OCF ₃	CF ₃	F
	A-1001	H	F	F	H	Cl
	A-1002	F	F	F	H	Cl
	A-1003	Cl	F	F	H	Cl
35	A-1004	CH ₃	F	F	H	Cl
	A-1005	CH ₂ CH ₃	F	F	H	Cl
	A-1006	H	F	Cl	H	Cl
	A-1007	F	F	Cl	H	Cl
	A-1008	Cl	F	Cl	H	Cl
40	A-1009	CH ₃	F	Cl	H	Cl
	A-1010	CH ₂ CH ₃	F	Cl	H	Cl
	A-1011	H	F	CHF ₂	H	Cl
	A-1012	F	F	CHF ₂	H	Cl

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1013	Cl	F	CHF ₂	H	Cl
A-1014	CH ₃	F	CHF ₂	H	Cl
5 A-1015	CH ₂ CH ₃	F	CHF ₂	H	Cl
A-1016	H	F	CF ₃	H	Cl
A-1017	F	F	CF ₃	H	Cl
A-1018	Cl	F	CF ₃	H	Cl
10 A-1019	CH ₃	F	CF ₃	H	Cl
A-1020	CH ₂ CH ₃	F	CF ₃	H	Cl
A-1021	H	F	SCHF ₂	H	Cl
A-1022	F	F	SCHF ₂	H	Cl
A-1023	Cl	F	SCHF ₂	H	Cl
15 A-1024	CH ₃	F	SCHF ₂	H	Cl
A-1025	CH ₂ CH ₃	F	SCHF ₂	H	Cl
A-1026	H	F	SCF ₃	H	Cl
A-1027	F	F	SCF ₃	H	Cl
20 A-1028	Cl	F	SCF ₃	H	Cl
A-1029	CH ₃	F	SCF ₃	H	Cl
A-1030	CH ₂ CH ₃	F	SCF ₃	H	Cl
A-1031	H	F	OCHF ₂	H	Cl
25 A-1032	F	F	OCHF ₂	H	Cl
A-1033	Cl	F	OCHF ₂	H	Cl
A-1034	CH ₃	F	OCHF ₂	H	Cl
A-1035	CH ₂ CH ₃	F	OCHF ₂	H	Cl
30 A-1036	H	F	OCF ₃	H	Cl
A-1037	F	F	OCF ₃	H	Cl
A-1038	Cl	F	OCF ₃	H	Cl
A-1039	CH ₃	F	OCF ₃	H	Cl
A-1040	CH ₂ CH ₃	F	OCF ₃	H	Cl
35 A-1041	H	F	F	F	Cl
A-1042	F	F	F	F	Cl
A-1043	Cl	F	F	F	Cl
A-1044	CH ₃	F	F	F	Cl
40 A-1045	CH ₂ CH ₃	F	F	F	Cl
A-1046	H	F	Cl	F	Cl
A-1047	F	F	Cl	F	Cl
A-1048	Cl	F	Cl	F	Cl
45 A-1049	CH ₃	F	Cl	F	Cl
A-1050	CH ₂ CH ₃	F	Cl	F	Cl
A-1051	H	F	CHF ₂	F	Cl

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1052	F	F	CHF ₂	F	Cl
A-1053	Cl	F	CHF ₂	F	Cl
5 A-1054	CH ₃	F	CHF ₂	F	Cl
A-1055	CH ₂ CH ₃	F	CHF ₂	F	Cl
A-1056	H	F	CF ₃	F	Cl
A-1057	F	F	CF ₃	F	Cl
10 A-1058	Cl	F	CF ₃	F	Cl
A-1059	CH ₃	F	CF ₃	F	Cl
A-1060	CH ₂ CH ₃	F	CF ₃	F	Cl
A-1061	H	F	SCHF ₂	F	Cl
A-1062	F	F	SCHF ₂	F	Cl
15 A-1063	Cl	F	SCHF ₂	F	Cl
A-1064	CH ₃	F	SCHF ₂	F	Cl
A-1065	CH ₂ CH ₃	F	SCHF ₂	F	Cl
A-1066	H	F	SCF ₃	F	Cl
20 A-1067	F	F	SCF ₃	F	Cl
A-1068	Cl	F	SCF ₃	F	Cl
A-1069	CH ₃	F	SCF ₃	F	Cl
A-1070	CH ₂ CH ₃	F	SCF ₃	F	Cl
25 A-1071	H	F	OCHF ₂	F	Cl
A-1072	F	F	OCHF ₂	F	Cl
A-1073	Cl	F	OCHF ₂	F	Cl
A-1074	CH ₃	F	OCHF ₂	F	Cl
A-1075	CH ₂ CH ₃	F	OCHF ₂	F	Cl
30 A-1076	H	F	OCF ₃	F	Cl
A-1077	F	F	OCF ₃	F	Cl
A-1078	Cl	F	OCF ₃	F	Cl
A-1079	CH ₃	F	OCF ₃	F	Cl
35 A-1080	CH ₂ CH ₃	F	OCF ₃	F	Cl
A-1081	H	F	F	Cl	Cl
A-1082	F	F	F	Cl	Cl
A-1083	Cl	F	F	Cl	Cl
40 A-1084	CH ₃	F	F	Cl	Cl
A-1085	CH ₂ CH ₃	F	F	Cl	Cl
A-1086	H	F	Cl	Cl	Cl
A-1087	F	F	Cl	Cl	Cl
45 A-1088	Cl	F	Cl	Cl	Cl
A-1089	CH ₃	F	Cl	Cl	Cl
A-1090	CH ₂ CH ₃	F	Cl	Cl	Cl

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1091	H	F	CHF ₂	Cl	Cl
A-1092	F	F	CHF ₂	Cl	Cl
5 A-1093	Cl	F	CHF ₂	Cl	Cl
A-1094	CH ₃	F	CHF ₂	Cl	Cl
A-1095	CH ₂ CH ₃	F	CHF ₂	Cl	Cl
A-1096	H	F	CF ₃	Cl	Cl
10 A-1097	F	F	CF ₃	Cl	Cl
A-1098	Cl	F	CF ₃	Cl	Cl
A-1099	CH ₃	F	CF ₃	Cl	Cl
A-1100	CH ₂ CH ₃	F	CF ₃	Cl	Cl
A-1101	H	F	SCHF ₂	Cl	Cl
15 A-1102	F	F	SCHF ₂	Cl	Cl
A-1103	Cl	F	SCHF ₂	Cl	Cl
A-1104	CH ₃	F	SCHF ₂	Cl	Cl
A-1105	CH ₂ CH ₃	F	SCHF ₂	Cl	Cl
20 A-1106	H	F	SCF ₃	Cl	Cl
A-1107	F	F	SCF ₃	Cl	Cl
A-1108	Cl	F	SCF ₃	Cl	Cl
A-1109	CH ₃	F	SCF ₃	Cl	Cl
25 A-1110	CH ₂ CH ₃	F	SCF ₃	Cl	Cl
A-1111	H	F	OCHF ₂	Cl	Cl
A-1112	F	F	OCHF ₂	Cl	Cl
A-1113	Cl	F	OCHF ₂	Cl	Cl
30 A-1114	CH ₃	F	OCHF ₂	Cl	Cl
A-1115	CH ₂ CH ₃	F	OCHF ₂	Cl	Cl
A-1116	H	F	OCF ₃	Cl	Cl
A-1117	F	F	OCF ₃	Cl	Cl
A-1118	Cl	F	OCF ₃	Cl	Cl
35 A-1119	CH ₃	F	OCF ₃	Cl	Cl
A-1120	CH ₂ CH ₃	F	OCF ₃	Cl	Cl
A-1121	H	F	F	CHF ₂	Cl
A-1122	F	F	F	CHF ₂	Cl
40 A-1123	Cl	F	F	CHF ₂	Cl
A-1124	CH ₃	F	F	CHF ₂	Cl
A-1125	CH ₂ CH ₃	F	F	CHF ₂	Cl
A-1126	H	F	Cl	CHF ₂	Cl
45 A-1127	F	F	Cl	CHF ₂	Cl
A-1128	Cl	F	Cl	CHF ₂	Cl
A-1129	CH ₃	F	Cl	CHF ₂	Cl

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1130	CH ₂ CH ₃	F	Cl	CHF ₂	Cl
A-1131	H	F	CHF ₂	CHF ₂	Cl
5 A-1132	F	F	CHF ₂	CHF ₂	Cl
A-1133	Cl	F	CHF ₂	CHF ₂	Cl
A-1134	CH ₃	F	CHF ₂	CHF ₂	Cl
A-1135	CH ₂ CH ₃	F	CHF ₂	CHF ₂	Cl
A-1136	H	F	CF ₃	CHF ₂	Cl
10 A-1137	F	F	CF ₃	CHF ₂	Cl
A-1138	Cl	F	CF ₃	CHF ₂	Cl
A-1139	CH ₃	F	CF ₃	CHF ₂	Cl
A-1140	CH ₂ CH ₃	F	CF ₃	CHF ₂	Cl
15 A-1141	H	F	SCHF ₂	CHF ₂	Cl
A-1142	F	F	SCHF ₂	CHF ₂	Cl
A-1143	Cl	F	SCHF ₂	CHF ₂	Cl
A-1144	CH ₃	F	SCHF ₂	CHF ₂	Cl
20 A-1145	CH ₂ CH ₃	F	SCHF ₂	CHF ₂	Cl
A-1146	H	F	SCF ₃	CHF ₂	Cl
A-1147	F	F	SCF ₃	CHF ₂	Cl
A-1148	Cl	F	SCF ₃	CHF ₂	Cl
A-1149	CH ₃	F	SCF ₃	CHF ₂	Cl
25 A-1150	CH ₂ CH ₃	F	SCF ₃	CHF ₂	Cl
A-1151	H	F	OCHF ₂	CHF ₂	Cl
A-1152	F	F	OCHF ₂	CHF ₂	Cl
A-1153	Cl	F	OCHF ₂	CHF ₂	Cl
30 A-1154	CH ₃	F	OCHF ₂	CHF ₂	Cl
A-1155	CH ₂ CH ₃	F	OCHF ₂	CHF ₂	Cl
A-1156	H	F	OCF ₃	CHF ₂	Cl
A-1157	F	F	OCF ₃	CHF ₂	Cl
35 A-1158	Cl	F	OCF ₃	CHF ₂	Cl
A-1159	CH ₃	F	OCF ₃	CHF ₂	Cl
A-1160	CH ₂ CH ₃	F	OCF ₃	CHF ₂	Cl
A-1161	H	F	F	CF ₃	Cl
40 A-1162	F	F	F	CF ₃	Cl
A-1163	Cl	F	F	CF ₃	Cl
A-1164	CH ₃	F	F	CF ₃	Cl
A-1165	CH ₂ CH ₃	F	F	CF ₃	Cl
45 A-1166	H	F	Cl	CF ₃	Cl
A-1167	F	F	Cl	CF ₃	Cl
A-1168	Cl	F	Cl	CF ₃	Cl

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1169	CH ₃	F	Cl	CF ₃	Cl
A-1170	CH ₂ CH ₃	F	Cl	CF ₃	Cl
5 A-1171	H	F	CHF ₂	CF ₃	Cl
A-1172	F	F	CHF ₂	CF ₃	Cl
A-1173	Cl	F	CHF ₂	CF ₃	Cl
A-1174	CH ₃	F	CHF ₂	CF ₃	Cl
10 A-1175	CH ₂ CH ₃	F	CHF ₂	CF ₃	Cl
A-1176	H	F	CF ₃	CF ₃	Cl
A-1177	F	F	CF ₃	CF ₃	Cl
A-1178	Cl	F	CF ₃	CF ₃	Cl
A-1179	CH ₃	F	CF ₃	CF ₃	Cl
15 A-1180	CH ₂ CH ₃	F	CF ₃	CF ₃	Cl
A-1181	H	F	SCHF ₂	CF ₃	Cl
A-1182	F	F	SCHF ₂	CF ₃	Cl
A-1183	Cl	F	SCHF ₂	CF ₃	Cl
20 A-1184	CH ₃	F	SCHF ₂	CF ₃	Cl
A-1185	CH ₂ CH ₃	F	SCHF ₂	CF ₃	Cl
A-1186	H	F	SCF ₃	CF ₃	Cl
A-1187	F	F	SCF ₃	CF ₃	Cl
25 A-1188	Cl	F	SCF ₃	CF ₃	Cl
A-1189	CH ₃	F	SCF ₃	CF ₃	Cl
A-1190	CH ₂ CH ₃	F	SCF ₃	CF ₃	Cl
A-1191	H	F	OCHF ₂	CF ₃	Cl
30 A-1192	F	F	OCHF ₂	CF ₃	Cl
A-1193	Cl	F	OCHF ₂	CF ₃	Cl
A-1194	CH ₃	F	OCHF ₂	CF ₃	Cl
A-1195	CH ₂ CH ₃	F	OCHF ₂	CF ₃	Cl
35 A-1196	H	F	OCF ₃	CF ₃	Cl
A-1197	F	F	OCF ₃	CF ₃	Cl
A-1198	Cl	F	OCF ₃	CF ₃	Cl
A-1199	CH ₃	F	OCF ₃	CF ₃	Cl
A-1200	CH ₂ CH ₃	F	OCF ₃	CF ₃	Cl
40 A-1201	H	Cl	F	H	H
A-1202	F	Cl	F	H	H
A-1203	Cl	Cl	F	H	H
A-1204	CH ₃	Cl	F	H	H
45 A-1205	CH ₂ CH ₃	Cl	F	H	H
A-1206	H	Cl	Cl	H	H
A-1207	F	Cl	Cl	H	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1208	Cl	Cl	Cl	H	H
A-1209	CH ₃	Cl	Cl	H	H
5 A-1210	CH ₂ CH ₃	Cl	Cl	H	H
A-1211	H	Cl	CHF ₂	H	H
A-1212	F	Cl	CHF ₂	H	H
A-1213	Cl	Cl	CHF ₂	H	H
A-1214	CH ₃	Cl	CHF ₂	H	H
10 A-1215	CH ₂ CH ₃	Cl	CHF ₂	H	H
A-1216	H	Cl	CF ₃	H	H
A-1217	F	Cl	CF ₃	H	H
A-1218	Cl	Cl	CF ₃	H	H
15 A-1219	CH ₃	Cl	CF ₃	H	H
A-1220	CH ₂ CH ₃	Cl	CF ₃	H	H
A-1221	H	Cl	SCHF ₂	H	H
A-1222	F	Cl	SCHF ₂	H	H
20 A-1223	Cl	Cl	SCHF ₂	H	H
A-1224	CH ₃	Cl	SCHF ₂	H	H
A-1225	CH ₂ CH ₃	Cl	SCHF ₂	H	H
A-1226	H	Cl	SCF ₃	H	H
25 A-1227	F	Cl	SCF ₃	H	H
A-1228	Cl	Cl	SCF ₃	H	H
A-1229	CH ₃	Cl	SCF ₃	H	H
A-1230	CH ₂ CH ₃	Cl	SCF ₃	H	H
A-1231	H	Cl	OCHF ₂	H	H
30 A-1232	F	Cl	OCHF ₂	H	H
A-1233	Cl	Cl	OCHF ₂	H	H
A-1234	CH ₃	Cl	OCHF ₂	H	H
A-1235	CH ₂ CH ₃	Cl	OCHF ₂	H	H
35 A-1236	H	Cl	OCF ₃	H	H
A-1237	F	Cl	OCF ₃	H	H
A-1238	Cl	Cl	OCF ₃	H	H
A-1239	CH ₃	Cl	OCF ₃	H	H
40 A-1240	CH ₂ CH ₃	Cl	OCF ₃	H	H
A-1241	H	Cl	F	F	H
A-1242	F	Cl	F	F	H
A-1243	Cl	Cl	F	F	H
A-1244	CH ₃	Cl	F	F	H
45 A-1245	CH ₂ CH ₃	Cl	F	F	H
A-1246	H	Cl	Cl	F	H

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1247	F	Cl	Cl	F	H
A-1248	Cl	Cl	Cl	F	H
5 A-1249	CH ₃	Cl	Cl	F	H
A-1250	CH ₂ CH ₃	Cl	Cl	F	H
A-1251	H	Cl	CHF ₂	F	H
A-1252	F	Cl	CHF ₂	F	H
10 A-1253	Cl	Cl	CHF ₂	F	H
A-1254	CH ₃	Cl	CHF ₂	F	H
A-1255	CH ₂ CH ₃	Cl	CHF ₂	F	H
A-1256	H	Cl	CF ₃	F	H
A-1257	F	Cl	CF ₃	F	H
15 A-1258	Cl	Cl	CF ₃	F	H
A-1259	CH ₃	Cl	CF ₃	F	H
A-1260	CH ₂ CH ₃	Cl	CF ₃	F	H
A-1261	H	Cl	SCHF ₂	F	H
20 A-1262	F	Cl	SCHF ₂	F	H
A-1263	Cl	Cl	SCHF ₂	F	H
A-1264	CH ₃	Cl	SCHF ₂	F	H
A-1265	CH ₂ CH ₃	Cl	SCHF ₂	F	H
25 A-1266	H	Cl	SCF ₃	F	H
A-1267	F	Cl	SCF ₃	F	H
A-1268	Cl	Cl	SCF ₃	F	H
A-1269	CH ₃	Cl	SCF ₃	F	H
A-1270	CH ₂ CH ₃	Cl	SCF ₃	F	H
30 A-1271	H	Cl	OCHF ₂	F	H
A-1272	F	Cl	OCHF ₂	F	H
A-1273	Cl	Cl	OCHF ₂	F	H
A-1274	CH ₃	Cl	OCHF ₂	F	H
35 A-1275	CH ₂ CH ₃	Cl	OCHF ₂	F	H
A-1276	H	Cl	OCF ₃	F	H
A-1277	F	Cl	OCF ₃	F	H
A-1278	Cl	Cl	OCF ₃	F	H
40 A-1279	CH ₃	Cl	OCF ₃	F	H
A-1280	CH ₂ CH ₃	Cl	OCF ₃	F	H
A-1281	H	Cl	F	Cl	H
A-1282	F	Cl	F	Cl	H
45 A-1283	Cl	Cl	F	Cl	H
A-1284	CH ₃	Cl	F	Cl	H
A-1285	CH ₂ CH ₃	Cl	F	Cl	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
5	A-1286	H	Cl	Cl	H
	A-1287	F	Cl	Cl	H
	A-1288	Cl	Cl	Cl	H
	A-1289	CH ₃	Cl	Cl	H
	A-1290	CH ₂ CH ₃	Cl	Cl	H
10	A-1291	H	Cl	CHF ₂	H
	A-1292	F	Cl	CHF ₂	H
	A-1293	Cl	Cl	CHF ₂	H
	A-1294	CH ₃	Cl	CHF ₂	H
	A-1295	CH ₂ CH ₃	Cl	CHF ₂	H
15	A-1296	H	Cl	CF ₃	H
	A-1297	F	Cl	CF ₃	H
	A-1298	Cl	Cl	CF ₃	H
	A-1299	CH ₃	Cl	CF ₃	H
	A-1300	CH ₂ CH ₃	Cl	CF ₃	H
20	A-1301	H	Cl	SCHF ₂	H
	A-1302	F	Cl	SCHF ₂	H
	A-1303	Cl	Cl	SCHF ₂	H
	A-1304	CH ₃	Cl	SCHF ₂	H
	A-1305	CH ₂ CH ₃	Cl	SCHF ₂	H
25	A-1306	H	Cl	SCF ₃	H
	A-1307	F	Cl	SCF ₃	H
	A-1308	Cl	Cl	SCF ₃	H
	A-1309	CH ₃	Cl	SCF ₃	H
	A-1310	CH ₂ CH ₃	Cl	SCF ₃	H
30	A-1311	H	Cl	OCHF ₂	H
	A-1312	F	Cl	OCHF ₂	H
	A-1313	Cl	Cl	OCHF ₂	H
	A-1314	CH ₃	Cl	OCHF ₂	H
	A-1315	CH ₂ CH ₃	Cl	OCHF ₂	H
35	A-1316	H	Cl	OCF ₃	H
	A-1317	F	Cl	OCF ₃	H
	A-1318	Cl	Cl	OCF ₃	H
	A-1319	CH ₃	Cl	OCF ₃	H
	A-1320	CH ₂ CH ₃	Cl	OCF ₃	H
40	A-1321	H	Cl	F	CHF ₂
	A-1322	F	Cl	F	CHF ₂
	A-1323	Cl	Cl	F	CHF ₂
	A-1324	CH ₃		F	CHF ₂

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1325	CH ₂ CH ₃	Cl	F	CHF ₂	H
A-1326	H	Cl	Cl	CHF ₂	H
5 A-1327	F	Cl	Cl	CHF ₂	H
A-1328	Cl	Cl	Cl	CHF ₂	H
A-1329	CH ₃	Cl	Cl	CHF ₂	H
A-1330	CH ₂ CH ₃	Cl	Cl	CHF ₂	H
A-1331	H	Cl	CHF ₂	CHF ₂	H
10 A-1332	F	Cl	CHF ₂	CHF ₂	H
A-1333	Cl	Cl	CHF ₂	CHF ₂	H
A-1334	CH ₃	Cl	CHF ₂	CHF ₂	H
A-1335	CH ₂ CH ₃	Cl	CHF ₂	CHF ₂	H
15 A-1336	H	Cl	CF ₃	CHF ₂	H
A-1337	F	Cl	CF ₃	CHF ₂	H
A-1338	Cl	Cl	CF ₃	CHF ₂	H
A-1339	CH ₃	Cl	CF ₃	CHF ₂	H
20 A-1340	CH ₂ CH ₃	Cl	CF ₃	CHF ₂	H
A-1341	H	Cl	SCHF ₂	CHF ₂	H
A-1342	F	Cl	SCHF ₂	CHF ₂	H
A-1343	Cl	Cl	SCHF ₂	CHF ₂	H
25 A-1344	CH ₃	Cl	SCHF ₂	CHF ₂	H
A-1345	CH ₂ CH ₃	Cl	SCHF ₂	CHF ₂	H
A-1346	H	Cl	SCF ₃	CHF ₂	H
A-1347	F	Cl	SCF ₃	CHF ₂	H
A-1348	Cl	Cl	SCF ₃	CHF ₂	H
30 A-1349	CH ₃	Cl	SCF ₃	CHF ₂	H
A-1350	CH ₂ CH ₃	Cl	SCF ₃	CHF ₂	H
A-1351	H	Cl	OCHF ₂	CHF ₂	H
A-1352	F	Cl	OCHF ₂	CHF ₂	H
35 A-1353	Cl	Cl	OCHF ₂	CHF ₂	H
A-1354	CH ₃	Cl	OCHF ₂	CHF ₂	H
A-1355	CH ₂ CH ₃	Cl	OCHF ₂	CHF ₂	H
A-1356	H	Cl	OCF ₃	CHF ₂	H
40 A-1357	F	Cl	OCF ₃	CHF ₂	H
A-1358	Cl	Cl	OCF ₃	CHF ₂	H
A-1359	CH ₃	Cl	OCF ₃	CHF ₂	H
A-1360	CH ₂ CH ₃	Cl	OCF ₃	CHF ₂	H
45 A-1361	H	Cl	F	CF ₃	H
A-1362	F	Cl	F	CF ₃	H
A-1363	Cl	Cl	F	CF ₃	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1364	CH ₃	Cl	F	CF ₃	H
A-1365	CH ₂ CH ₃	Cl	F	CF ₃	H
5 A-1366	H	Cl	Cl	CF ₃	H
A-1367	F	Cl	Cl	CF ₃	H
A-1368	Cl	Cl	Cl	CF ₃	H
A-1369	CH ₃	Cl	Cl	CF ₃	H
10 A-1370	CH ₂ CH ₃	Cl	Cl	CF ₃	H
A-1371	H	Cl	CHF ₂	CF ₃	H
A-1372	F	Cl	CHF ₂	CF ₃	H
A-1373	Cl	Cl	CHF ₂	CF ₃	H
A-1374	CH ₃	Cl	CHF ₂	CF ₃	H
15 A-1375	CH ₂ CH ₃	Cl	CHF ₂	CF ₃	H
A-1376	H	Cl	CF ₃	CF ₃	H
A-1377	F	Cl	CF ₃	CF ₃	H
A-1378	Cl	Cl	CF ₃	CF ₃	H
20 A-1379	CH ₃	Cl	CF ₃	CF ₃	H
A-1380	CH ₂ CH ₃	Cl	CF ₃	CF ₃	H
A-1381	H	Cl	SCHF ₂	CF ₃	H
A-1382	F	Cl	SCHF ₂	CF ₃	H
25 A-1383	Cl	Cl	SCHF ₂	CF ₃	H
A-1384	CH ₃	Cl	SCHF ₂	CF ₃	H
A-1385	CH ₂ CH ₃	Cl	SCHF ₂	CF ₃	H
A-1386	H	Cl	SCF ₃	CF ₃	H
A-1387	F	Cl	SCF ₃	CF ₃	H
30 A-1388	Cl	Cl	SCF ₃	CF ₃	H
A-1389	CH ₃	Cl	SCF ₃	CF ₃	H
A-1390	CH ₂ CH ₃	Cl	SCF ₃	CF ₃	H
A-1391	H	Cl	OCHF ₂	CF ₃	H
35 A-1392	F	Cl	OCHF ₂	CF ₃	H
A-1393	Cl	Cl	OCHF ₂	CF ₃	H
A-1394	CH ₃	Cl	OCHF ₂	CF ₃	H
A-1395	CH ₂ CH ₃	Cl	OCHF ₂	CF ₃	H
40 A-1396	H	Cl	OCF ₃	CF ₃	H
A-1397	F	Cl	OCF ₃	CF ₃	H
A-1398	Cl	Cl	OCF ₃	CF ₃	H
A-1399	CH ₃	Cl	OCF ₃	CF ₃	H
45 A-1400	CH ₂ CH ₃	Cl	OCF ₃	CF ₃	H
A-1401	H	Cl	F	H	F
A-1402	F		F	H	F

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1403	Cl	Cl	F	H	F
A-1404	CH ₃	Cl	F	H	F
5 A-1405	CH ₂ CH ₃	Cl	F	H	F
A-1406	H	Cl	Cl	H	F
A-1407	F	Cl	Cl	H	F
A-1408	Cl	Cl	Cl	H	F
10 A-1409	CH ₃	Cl	Cl	H	F
A-1410	CH ₂ CH ₃	Cl	Cl	H	F
A-1411	H	Cl	CHF ₂	H	F
A-1412	F	Cl	CHF ₂	H	F
A-1413	Cl	Cl	CHF ₂	H	F
15 A-1414	CH ₃	Cl	CHF ₂	H	F
A-1415	CH ₂ CH ₃	Cl	CHF ₂	H	F
A-1416	H	Cl	CF ₃	H	F
A-1417	F	Cl	CF ₃	H	F
20 A-1418	Cl	Cl	CF ₃	H	F
A-1419	CH ₃	Cl	CF ₃	H	F
A-1420	CH ₂ CH ₃	Cl	CF ₃	H	F
A-1421	H	Cl	SCHF ₂	H	F
25 A-1422	F	Cl	SCHF ₂	H	F
A-1423	Cl	Cl	SCHF ₂	H	F
A-1424	CH ₃	Cl	SCHF ₂	H	F
A-1425	CH ₂ CH ₃	Cl	SCHF ₂	H	F
30 A-1426	H	Cl	SCF ₃	H	F
A-1427	F	Cl	SCF ₃	H	F
A-1428	Cl	Cl	SCF ₃	H	F
A-1429	CH ₃	Cl	SCF ₃	H	F
A-1430	CH ₂ CH ₃	Cl	SCF ₃	H	F
35 A-1431	H	Cl	OCHF ₂	H	F
A-1432	F	Cl	OCHF ₂	H	F
A-1433	Cl	Cl	OCHF ₂	H	F
A-1434	CH ₃	Cl	OCHF ₂	H	F
40 A-1435	CH ₂ CH ₃	Cl	OCHF ₂	H	F
A-1436	H	Cl	OCF ₃	H	F
A-1437	F	Cl	OCF ₃	H	F
A-1438	Cl	Cl	OCF ₃	H	F
45 A-1439	CH ₃	Cl	OCF ₃	H	F
A-1440	CH ₂ CH ₃	Cl	OCF ₃	H	F
A-1441	H	Cl	F	F	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1442	F	Cl	F	F	F
A-1443	Cl	Cl	F	F	F
5 A-1444	CH ₃	Cl	F	F	F
A-1445	CH ₂ CH ₃	Cl	F	F	F
A-1446	H	Cl	Cl	F	F
A-1447	F	Cl	Cl	F	F
10 A-1448	Cl	Cl	Cl	F	F
A-1449	CH ₃	Cl	Cl	F	F
A-1450	CH ₂ CH ₃	Cl	Cl	F	F
A-1451	H	Cl	CHF ₂	F	F
A-1452	F	Cl	CHF ₂	F	F
15 A-1453	Cl	Cl	CHF ₂	F	F
A-1454	CH ₃	Cl	CHF ₂	F	F
A-1455	CH ₂ CH ₃	Cl	CHF ₂	F	F
A-1456	H	Cl	CF ₃	F	F
20 A-1457	F	Cl	CF ₃	F	F
A-1458	Cl	Cl	CF ₃	F	F
A-1459	CH ₃	Cl	CF ₃	F	F
A-1460	CH ₂ CH ₃	Cl	CF ₃	F	F
25 A-1461	H	Cl	SCHF ₂	F	F
A-1462	F	Cl	SCHF ₂	F	F
A-1463	Cl	Cl	SCHF ₂	F	F
A-1464	CH ₃	Cl	SCHF ₂	F	F
A-1465	CH ₂ CH ₃	Cl	SCHF ₂	F	F
30 A-1466	H	Cl	SCF ₃	F	F
A-1467	F	Cl	SCF ₃	F	F
A-1468	Cl	Cl	SCF ₃	F	F
A-1469	CH ₃	Cl	SCF ₃	F	F
35 A-1470	CH ₂ CH ₃	Cl	SCF ₃	F	F
A-1471	H	Cl	OCHF ₂	F	F
A-1472	F	Cl	OCHF ₂	F	F
A-1473	Cl	Cl	OCHF ₂	F	F
40 A-1474	CH ₃	Cl	OCHF ₂	F	F
A-1475	CH ₂ CH ₃	Cl	OCHF ₂	F	F
A-1476	H	Cl	OCF ₃	F	F
A-1477	F	Cl	OCF ₃	F	F
45 A-1478	Cl	Cl	OCF ₃	F	F
A-1479	CH ₃	Cl	OCF ₃	F	F
A-1480	CH ₂ CH ₃	Cl	OCF ₃	F	F

77

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1481	H	Cl	F	Cl	F
A-1482	F	Cl	F	Cl	F
5 A-1483	Cl	Cl	F	Cl	F
A-1484	CH ₃	Cl	F	Cl	F
A-1485	CH ₂ CH ₃	Cl	F	Cl	F
A-1486	H	Cl	Cl	Cl	F
10 A-1487	F	Cl	Cl	Cl	F
A-1488	Cl	Cl	Cl	Cl	F
A-1489	CH ₃	Cl	Cl	Cl	F
A-1490	CH ₂ CH ₃	Cl	Cl	Cl	F
A-1491	H	Cl	CHF ₂	Cl	F
15 A-1492	F	Cl	CHF ₂	Cl	F
A-1493	Cl	Cl	CHF ₂	Cl	F
A-1494	CH ₃	Cl	CHF ₂	Cl	F
A-1495	CH ₂ CH ₃	Cl	CHF ₂	Cl	F
20 A-1496	H	Cl	CF ₃	Cl	F
A-1497	F	Cl	CF ₃	Cl	F
A-1498	Cl	Cl	CF ₃	Cl	F
A-1499	CH ₃	Cl	CF ₃	Cl	F
25 A-1500	CH ₂ CH ₃	Cl	CF ₃	Cl	F
A-1501	H	Cl	SCHF ₂	Cl	F
A-1502	F	Cl	SCHF ₂	Cl	F
A-1503	Cl	Cl	SCHF ₂	Cl	F
30 A-1504	CH ₃	Cl	SCHF ₂	Cl	F
A-1505	CH ₂ CH ₃	Cl	SCHF ₂	Cl	F
A-1506	H	Cl	SCF ₃	Cl	F
A-1507	F	Cl	SCF ₃	Cl	F
A-1508	Cl	Cl	SCF ₃	Cl	F
35 A-1509	CH ₃	Cl	SCF ₃	Cl	F
A-1510	CH ₂ CH ₃	Cl	SCF ₃	Cl	F
A-1511	H	Cl	OCHF ₂	Cl	F
A-1512	F	Cl	OCHF ₂	Cl	F
40 A-1513	Cl	Cl	OCHF ₂	Cl	F
A-1514	CH ₃	Cl	OCHF ₂	Cl	F
A-1515	CH ₂ CH ₃	Cl	OCHF ₂	Cl	F
A-1516	H	Cl	OCF ₃	Cl	F
45 A-1517	F	Cl	OCF ₃	Cl	F
A-1518	Cl	Cl	OCF ₃	Cl	F
A-1519	CH ₃	Cl	OCF ₃	Cl	F

78

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1520	CH ₂ CH ₃	Cl	OCF ₃	Cl	F
A-1521	H	Cl	F	CHF ₂	F
5 A-1522	F	Cl	F	CHF ₂	F
A-1523	Cl	Cl	F	CHF ₂	F
A-1524	CH ₃	Cl	F	CHF ₂	F
A-1525	CH ₂ CH ₃	Cl	F	CHF ₂	F
10 A-1526	H	Cl	Cl	CHF ₂	F
A-1527	F	Cl	Cl	CHF ₂	F
A-1528	Cl	Cl	Cl	CHF ₂	F
A-1529	CH ₃	Cl	Cl	CHF ₂	F
A-1530	CH ₂ CH ₃	Cl	Cl	CHF ₂	F
15 A-1531	H	Cl	CHF ₂	CHF ₂	F
A-1532	F	Cl	CHF ₂	CHF ₂	F
A-1533	Cl	Cl	CHF ₂	CHF ₂	F
A-1534	CH ₃	Cl	CHF ₂	CHF ₂	F
20 A-1535	CH ₂ CH ₃	Cl	CHF ₂	CHF ₂	F
A-1536	H	Cl	CF ₃	CHF ₂	F
A-1537	F	Cl	CF ₃	CHF ₂	F
A-1538	Cl	Cl	CF ₃	CHF ₂	F
A-1539	CH ₃	Cl	CF ₃	CHF ₂	F
25 A-1540	CH ₂ CH ₃	Cl	CF ₃	CHF ₂	F
A-1541	H	Cl	SCHF ₂	CHF ₂	F
A-1542	F	Cl	SCHF ₂	CHF ₂	F
A-1543	Cl	Cl	SCHF ₂	CHF ₂	F
30 A-1544	CH ₃	Cl	SCHF ₂	CHF ₂	F
A-1545	CH ₂ CH ₃	Cl	SCHF ₂	CHF ₂	F
A-1546	H	Cl	SCF ₃	CHF ₂	F
A-1547	F	Cl	SCF ₃	CHF ₂	F
35 A-1548	Cl	Cl	SCF ₃	CHF ₂	F
A-1549	CH ₃	Cl	SCF ₃	CHF ₂	F
A-1550	CH ₂ CH ₃	Cl	SCF ₃	CHF ₂	F
A-1551	H	Cl	OCHF ₂	CHF ₂	F
40 A-1552	F	Cl	OCHF ₂	CHF ₂	F
A-1553	Cl	Cl	OCHF ₂	CHF ₂	F
A-1554	CH ₃	Cl	OCHF ₂	CHF ₂	F
A-1555	CH ₂ CH ₃	Cl	OCHF ₂	CHF ₂	F
45 A-1556	H	Cl	OCF ₃	CHF ₂	F
A-1557	F	Cl	OCF ₃	CHF ₂	F
A-1558	Cl	Cl	OCF ₃	CHF ₂	F

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1559	CH ₃	Cl	OCF ₃	CHF ₂	F
A-1560	CH ₂ CH ₃	Cl	OCF ₃	CHF ₂	F
5 A-1561	H	Cl	F	CF ₃	F
A-1562	F	Cl	F	CF ₃	F
A-1563	Cl	Cl	F	CF ₃	F
A-1564	CH ₃	Cl	F	CF ₃	F
10 A-1565	CH ₂ CH ₃	Cl	F	CF ₃	F
A-1566	H	Cl	Cl	CF ₃	F
A-1567	F	Cl	Cl	CF ₃	F
A-1568	Cl	Cl	Cl	CF ₃	F
A-1569	CH ₃	Cl	Cl	CF ₃	F
15 A-1570	CH ₂ CH ₃	Cl	Cl	CF ₃	F
A-1571	H	Cl	CHF ₂	CF ₃	F
A-1572	F	Cl	CHF ₂	CF ₃	F
A-1573	Cl	Cl	CHF ₂	CF ₃	F
20 A-1574	CH ₃	Cl	CHF ₂	CF ₃	F
A-1575	CH ₂ CH ₃	Cl	CHF ₂	CF ₃	F
A-1576	H	Cl	CF ₃	CF ₃	F
A-1577	F	Cl	CF ₃	CF ₃	F
25 A-1578	Cl	Cl	CF ₃	CF ₃	F
A-1579	CH ₃	Cl	CF ₃	CF ₃	F
A-1580	CH ₂ CH ₃	Cl	CF ₃	CF ₃	F
A-1581	H	Cl	SCHF ₂	CF ₃	F
A-1582	F	Cl	SCHF ₂	CF ₃	F
30 A-1583	Cl	Cl	SCHF ₂	CF ₃	F
A-1584	CH ₃	Cl	SCHF ₂	CF ₃	F
A-1585	CH ₂ CH ₃	Cl	SCHF ₂	CF ₃	F
A-1586	H	Cl	SCF ₃	CF ₃	F
35 A-1587	F	Cl	SCF ₃	CF ₃	F
A-1588	Cl	Cl	SCF ₃	CF ₃	F
A-1589	CH ₃	Cl	SCF ₃	CF ₃	F
A-1590	CH ₂ CH ₃	Cl	SCF ₃	CF ₃	F
40 A-1591	H	Cl	OCHF ₂	CF ₃	F
A-1592	F	Cl	OCHF ₂	CF ₃	F
A-1593	Cl	Cl	OCHF ₂	CF ₃	F
A-1594	CH ₃	Cl	OCHF ₂	CF ₃	F
45 A-1595	CH ₂ CH ₃	Cl	OCHF ₂	CF ₃	F
A-1596	H	Cl	OCF ₃	CF ₃	F
A-1597	F	Cl	OCF ₃	CF ₃	F

80

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1598	Cl	Cl	OCF ₃	CF ₃	F
A-1599	CH ₃	Cl	OCF ₃	CF ₃	F
5 A-1600	CH ₂ CH ₃	Cl	OCF ₃	CF ₃	F
A-1601	H	Cl	F	H	Cl
A-1602	F	Cl	F	H	Cl
A-1603	Cl	Cl	F	H	Cl
A-1604	CH ₃	Cl	F	H	Cl
10 A-1605	CH ₂ CH ₃	Cl	F	H	Cl
A-1606	H	Cl	Cl	H	Cl
A-1607	F	Cl	Cl	H	Cl
A-1608	Cl	Cl	Cl	H	Cl
15 A-1609	CH ₃	Cl	Cl	H	Cl
A-1610	CH ₂ CH ₃	Cl	Cl	H	Cl
A-1611	H	Cl	CHF ₂	H	Cl
A-1612	F	Cl	CHF ₂	H	Cl
20 A-1613	Cl	Cl	CHF ₂	H	Cl
A-1614	CH ₃	Cl	CHF ₂	H	Cl
A-1615	CH ₂ CH ₃	Cl	CHF ₂	H	Cl
A-1616	H	Cl	CF ₃	H	Cl
25 A-1617	F	Cl	CF ₃	H	Cl
A-1618	Cl	Cl	CF ₃	H	Cl
A-1619	CH ₃	Cl	CF ₃	H	Cl
A-1620	CH ₂ CH ₃	Cl	CF ₃	H	Cl
A-1621	H	Cl	SCHF ₂	H	Cl
30 A-1622	F	Cl	SCHF ₂	H	Cl
A-1623	Cl	Cl	SCHF ₂	H	Cl
A-1624	CH ₃	Cl	SCHF ₂	H	Cl
A-1625	CH ₂ CH ₃	Cl	SCHF ₂	H	Cl
35 A-1626	H	Cl	SCF ₃	H	Cl
A-1627	F	Cl	SCF ₃	H	Cl
A-1628	Cl	Cl	SCF ₃	H	Cl
A-1629	CH ₃	Cl	SCF ₃	H	Cl
40 A-1630	CH ₂ CH ₃	Cl	SCF ₃	H	Cl
A-1631	H	Cl	OCHF ₂	H	Cl
A-1632	F	Cl	OCHF ₂	H	Cl
A-1633	Cl	Cl	OCHF ₂	H	Cl
A-1634	CH ₃	Cl	OCHF ₂	H	Cl
45 A-1635	CH ₂ CH ₃	Cl	OCHF ₂	H	Cl
A-1636	H	Cl	OCF ₃	H	Cl

81

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1637	F	Cl	OCF ₃	H	Cl
A-1638	Cl	Cl	OCF ₃	H	Cl
5 A-1639	CH ₃	Cl	OCF ₃	H	Cl
A-1640	CH ₂ CH ₃	Cl	OCF ₃	H	Cl
A-1641	H	Cl	F	F	Cl
A-1642	F	Cl	F	F	Cl
10 A-1643	Cl	Cl	F	F	Cl
A-1644	CH ₃	Cl	F	F	Cl
A-1645	CH ₂ CH ₃	Cl	F	F	Cl
A-1646	H	Cl	Cl	F	Cl
A-1647	F	Cl	Cl	F	Cl
15 A-1648	Cl	Cl	Cl	F	Cl
A-1649	CH ₃	Cl	Cl	F	Cl
A-1650	CH ₂ CH ₃	Cl	Cl	F	Cl
A-1651	H	Cl	CHF ₂	F	Cl
20 A-1652	F	Cl	CHF ₂	F	Cl
A-1653	Cl	Cl	CHF ₂	F	Cl
A-1654	CH ₃	Cl	CHF ₂	F	Cl
A-1655	CH ₂ CH ₃	Cl	CHF ₂	F	Cl
25 A-1656	H	Cl	CF ₃	F	Cl
A-1657	F	Cl	CF ₃	F	Cl
A-1658	Cl	Cl	CF ₃	F	Cl
A-1659	CH ₃	Cl	CF ₃	F	Cl
A-1660	CH ₂ CH ₃	Cl	CF ₃	F	Cl
30 A-1661	H	Cl	SCHF ₂	F	Cl
A-1662	F	Cl	SCHF ₂	F	Cl
A-1663	Cl	Cl	SCHF ₂	F	Cl
A-1664	CH ₃	Cl	SCHF ₂	F	Cl
35 A-1665	CH ₂ CH ₃	Cl	SCHF ₂	F	Cl
A-1666	H	Cl	SCF ₃	F	Cl
A-1667	F	Cl	SCF ₃	F	Cl
A-1668	Cl	Cl	SCF ₃	F	Cl
40 A-1669	CH ₃	Cl	SCF ₃	F	Cl
A-1670	CH ₂ CH ₃	Cl	SCF ₃	F	Cl
A-1671	H	Cl	OCHF ₂	F	Cl
A-1672	F	Cl	OCHF ₂	F	Cl
45 A-1673	Cl	Cl	OCHF ₂	F	Cl
A-1674	CH ₃	Cl	OCHF ₂	F	Cl
A-1675	CH ₂ CH ₃	Cl	OCHF ₂	F	Cl

82

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1676	H	Cl	OCF ₃	F	Cl
A-1677	F	Cl	OCF ₃	F	Cl
5 A-1678	Cl	Cl	OCF ₃	F	Cl
A-1679	CH ₃	Cl	OCF ₃	F	Cl
A-1680	CH ₂ CH ₃	Cl	OCF ₃	F	Cl
A-1681	H	Cl	F	Cl	Cl
10 A-1682	F	Cl	F	Cl	Cl
A-1683	Cl	Cl	F	Cl	Cl
A-1684	CH ₃	Cl	F	Cl	Cl
A-1685	CH ₂ CH ₃	Cl	F	Cl	Cl
A-1686	H	Cl	Cl	Cl	Cl
15 A-1687	F	Cl	Cl	Cl	Cl
A-1688	Cl	Cl	Cl	Cl	Cl
A-1689	CH ₃	Cl	Cl	Cl	Cl
A-1690	CH ₂ CH ₃	Cl	Cl	Cl	Cl
20 A-1691	H	Cl	CHF ₂	Cl	Cl
A-1692	F	Cl	CHF ₂	Cl	Cl
A-1693	Cl	Cl	CHF ₂	Cl	Cl
A-1694	CH ₃	Cl	CHF ₂	Cl	Cl
25 A-1695	CH ₂ CH ₃	Cl	CHF ₂	Cl	Cl
A-1696	H	Cl	CF ₃	Cl	Cl
A-1697	F	Cl	CF ₃	Cl	Cl
A-1698	Cl	Cl	CF ₃	Cl	Cl
A-1699	CH ₃	Cl	CF ₃	Cl	Cl
30 A-1700	CH ₂ CH ₃	Cl	CF ₃	Cl	Cl
A-1701	H	Cl	SCHF ₂	Cl	Cl
A-1702	F	Cl	SCHF ₂	Cl	Cl
A-1703	Cl	Cl	SCHF ₂	Cl	Cl
35 A-1704	CH ₃	Cl	SCHF ₂	Cl	Cl
A-1705	CH ₂ CH ₃	Cl	SCHF ₂	Cl	Cl
A-1706	H	Cl	SCF ₃	Cl	Cl
A-1707	F	Cl	SCF ₃	Cl	Cl
40 A-1708	Cl	Cl	SCF ₃	Cl	Cl
A-1709	CH ₃	Cl	SCF ₃	Cl	Cl
A-1710	CH ₂ CH ₃	Cl	SCF ₃	Cl	Cl
A-1711	H	Cl	OCHF ₂	Cl	Cl
45 A-1712	F	Cl	OCHF ₂	Cl	Cl
A-1713	Cl	Cl	OCHF ₂	Cl	Cl
A-1714	CH ₃	Cl	OCHF ₂	Cl	Cl

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
5	A-1715	CH ₂ CH ₃	Cl	OCHF ₂	Cl
	A-1716	H	Cl	OCF ₃	Cl
	A-1717	F	Cl	OCF ₃	Cl
	A-1718	Cl	Cl	OCF ₃	Cl
	A-1719	CH ₃	Cl	OCF ₃	Cl
10	A-1720	CH ₂ CH ₃	Cl	OCF ₃	Cl
	A-1721	H	Cl	F	CHF ₂
	A-1722	F	Cl	F	CHF ₂
	A-1723	Cl	Cl	F	CHF ₂
	A-1724	CH ₃	Cl	F	CHF ₂
15	A-1725	CH ₂ CH ₃	Cl	F	CHF ₂
	A-1726	H	Cl	Cl	CHF ₂
	A-1727	F	Cl	Cl	CHF ₂
	A-1728	Cl	Cl	Cl	CHF ₂
	A-1729	CH ₃	Cl	Cl	CHF ₂
20	A-1730	CH ₂ CH ₃	Cl	Cl	CHF ₂
	A-1731	H	Cl	CHF ₂	CHF ₂
	A-1732	F	Cl	CHF ₂	CHF ₂
	A-1733	Cl	Cl	CHF ₂	CHF ₂
	A-1734	CH ₃	Cl	CHF ₂	CHF ₂
25	A-1735	CH ₂ CH ₃	Cl	CHF ₂	CHF ₂
	A-1736	H	Cl	CF ₃	CHF ₂
	A-1737	F	Cl	CF ₃	CHF ₂
	A-1738	Cl	Cl	CF ₃	CHF ₂
	A-1739	CH ₃	Cl	CF ₃	CHF ₂
30	A-1740	CH ₂ CH ₃	Cl	CF ₃	CHF ₂
	A-1741	H	Cl	SCHF ₂	CHF ₂
	A-1742	F	Cl	SCHF ₂	CHF ₂
	A-1743	Cl	Cl	SCHF ₂	CHF ₂
	A-1744	CH ₃	Cl	SCHF ₂	CHF ₂
35	A-1745	CH ₂ CH ₃	Cl	SCHF ₂	CHF ₂
	A-1746	H	Cl	SCF ₃	CHF ₂
	A-1747	F	Cl	SCF ₃	CHF ₂
	A-1748	Cl	Cl	SCF ₃	CHF ₂
	A-1749	CH ₃	Cl	SCF ₃	CHF ₂
40	A-1750	CH ₂ CH ₃	Cl	SCF ₃	CHF ₂
	A-1751	H	Cl	OCHF ₂	CHF ₂
	A-1752	F	Cl	OCHF ₂	CHF ₂
	A-1753	Cl	Cl	OCHF ₂	CHF ₂
	A-1753	Cl	Cl	OCHF ₂	CHF ₂

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1754	CH ₃	Cl	OCHF ₂	CHF ₂	Cl
A-1755	CH ₂ CH ₃	Cl	OCHF ₂	CHF ₂	Cl
5 A-1756	H	Cl	OCF ₃	CHF ₂	Cl
A-1757	F	Cl	OCF ₃	CHF ₂	Cl
A-1758	Cl	Cl	OCF ₃	CHF ₂	Cl
A-1759	CH ₃	Cl	OCF ₃	CHF ₂	Cl
10 A-1760	CH ₂ CH ₃	Cl	OCF ₃	CHF ₂	Cl
A-1761	H	Cl	F	CF ₃	Cl
A-1762	F	Cl	F	CF ₃	Cl
A-1763	Cl	Cl	F	CF ₃	Cl
A-1764	CH ₃	Cl	F	CF ₃	Cl
15 A-1765	CH ₂ CH ₃	Cl	F	CF ₃	Cl
A-1766	H	Cl	Cl	CF ₃	Cl
A-1767	F	Cl	Cl	CF ₃	Cl
A-1768	Cl	Cl	Cl	CF ₃	Cl
20 A-1769	CH ₃	Cl	Cl	CF ₃	Cl
A-1770	CH ₂ CH ₃	Cl	Cl	CF ₃	Cl
A-1771	H	Cl	CHF ₂	CF ₃	Cl
A-1772	F	Cl	CHF ₂	CF ₃	Cl
25 A-1773	Cl	Cl	CHF ₂	CF ₃	Cl
A-1774	CH ₃	Cl	CHF ₂	CF ₃	Cl
A-1775	CH ₂ CH ₃	Cl	CHF ₂	CF ₃	Cl
A-1776	H	Cl	CF ₃	CF ₃	Cl
A-1777	F	Cl	CF ₃	CF ₃	Cl
30 A-1778	Cl	Cl	CF ₃	CF ₃	Cl
A-1779	CH ₃	Cl	CF ₃	CF ₃	Cl
A-1780	CH ₂ CH ₃	Cl	CF ₃	CF ₃	Cl
A-1781	H	Cl	SCHF ₂	CF ₃	Cl
35 A-1782	F	Cl	SCHF ₂	CF ₃	Cl
A-1783	Cl	Cl	SCHF ₂	CF ₃	Cl
A-1784	CH ₃	Cl	SCHF ₂	CF ₃	Cl
A-1785	CH ₂ CH ₃	Cl	SCHF ₂	CF ₃	Cl
40 A-1786	H	Cl	SCF ₃	CF ₃	Cl
A-1787	F	Cl	SCF ₃	CF ₃	Cl
A-1788	Cl	Cl	SCF ₃	CF ₃	Cl
A-1789	CH ₃	Cl	SCF ₃	CF ₃	Cl
45 A-1790	CH ₂ CH ₃	Cl	SCF ₃	CF ₃	Cl
A-1791	H	Cl	OCHF ₂	CF ₃	Cl
A-1792	F	Cl	OCHF ₂	CF ₃	Cl

85

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1793	Cl	Cl	OCHF ₂	CF ₃	Cl
A-1794	CH ₃	Cl	OCHF ₂	CF ₃	Cl
5 A-1795	CH ₂ CH ₃	Cl	OCHF ₂	CF ₃	Cl
A-1796	H	Cl	OCF ₃	CF ₃	Cl
A-1797	F	Cl	OCF ₃	CF ₃	Cl
A-1798	Cl	Cl	OCF ₃	CF ₃	Cl
A-1799	CH ₃	Cl	OCF ₃	CF ₃	Cl
10 A-1800	CH ₂ CH ₃	Cl	OCF ₃	CF ₃	Cl
A-1801	H	CH ₃	F	H	H
A-1802	F	CH ₃	F	H	H
A-1803	Cl	CH ₃	F	H	H
15 A-1804	CH ₃	CH ₃	F	H	H
A-1805	CH ₂ CH ₃	CH ₃	F	H	H
A-1806	H	CH ₃	Cl	H	H
A-1807	F	CH ₃	Cl	H	H
20 A-1808	Cl	CH ₃	Cl	H	H
A-1809	CH ₃	CH ₃	Cl	H	H
A-1810	CH ₂ CH ₃	CH ₃	Cl	H	H
A-1811	H	CH ₃	CHF ₂	H	H
25 A-1812	F	CH ₃	CHF ₂	H	H
A-1813	Cl	CH ₃	CHF ₂	H	H
A-1814	CH ₃	CH ₃	CHF ₂	H	H
A-1815	CH ₂ CH ₃	CH ₃	CHF ₂	H	H
30 A-1816	H	CH ₃	CF ₃	H	H
A-1817	F	CH ₃	CF ₃	H	H
A-1818	Cl	CH ₃	CF ₃	H	H
A-1819	CH ₃	CH ₃	CF ₃	H	H
A-1820	CH ₂ CH ₃	CH ₃	CF ₃	H	H
35 A-1821	H	CH ₃	SCHF ₂	H	H
A-1822	F	CH ₃	SCHF ₂	H	H
A-1823	Cl	CH ₃	SCHF ₂	H	H
A-1824	CH ₃	CH ₃	SCHF ₂	H	H
40 A-1825	CH ₂ CH ₃	CH ₃	SCHF ₂	H	H
A-1826	H	CH ₃	SCF ₃	H	H
A-1827	F	CH ₃	SCF ₃	H	H
A-1828	Cl	CH ₃	SCF ₃	H	H
45 A-1829	CH ₃	CH ₃	SCF ₃	H	H
A-1830	CH ₂ CH ₃	CH ₃	SCF ₃	H	H
A-1831	H	CH ₃	OCHF ₂	H	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1832	F	CH ₃	OCHF ₂	H	H
A-1833	Cl	CH ₃	OCHF ₂	H	H
5 A-1834	CH ₃	CH ₃	OCHF ₂	H	H
A-1835	CH ₂ CH ₃	CH ₃	OCHF ₂	H	H
A-1836	H	CH ₃	OCF ₃	H	H
A-1837	F	CH ₃	OCF ₃	H	H
10 A-1838	Cl	CH ₃	OCF ₃	H	H
A-1839	CH ₃	CH ₃	OCF ₃	H	H
A-1840	CH ₂ CH ₃	CH ₃	OCF ₃	H	H
A-1841	H	CH ₃	F	F	H
A-1842	F	CH ₃	F	F	H
15 A-1843	Cl	CH ₃	F	F	H
A-1844	CH ₃	CH ₃	F	F	H
A-1845	CH ₂ CH ₃	CH ₃	F	F	H
A-1846	H	CH ₃	Cl	F	H
20 A-1847	F	CH ₃	Cl	F	H
A-1848	Cl	CH ₃	Cl	F	H
A-1849	CH ₃	CH ₃	Cl	F	H
A-1850	CH ₂ CH ₃	CH ₃	Cl	F	H
25 A-1851	H	CH ₃	CHF ₂	F	H
A-1852	F	CH ₃	CHF ₂	F	H
A-1853	Cl	CH ₃	CHF ₂	F	H
A-1854	CH ₃	CH ₃	CHF ₂	F	H
A-1855	CH ₂ CH ₃	CH ₃	CHF ₂	F	H
30 A-1856	H	CH ₃	CF ₃	F	H
A-1857	F	CH ₃	CF ₃	F	H
A-1858	Cl	CH ₃	CF ₃	F	H
A-1859	CH ₃	CH ₃	CF ₃	F	H
35 A-1860	CH ₂ CH ₃	CH ₃	CF ₃	F	H
A-1861	H	CH ₃	SCHF ₂	F	H
A-1862	F	CH ₃	SCHF ₂	F	H
A-1863	Cl	CH ₃	SCHF ₂	F	H
40 A-1864	CH ₃	CH ₃	SCHF ₂	F	H
A-1865	CH ₂ CH ₃	CH ₃	SCHF ₂	F	H
A-1866	H	CH ₃	SCF ₃	F	H
A-1867	F	CH ₃	SCF ₃	F	H
A-1868	Cl	CH ₃	SCF ₃	F	H
45 A-1869	CH ₃	CH ₃	SCF ₃	F	H
A-1870	CH ₂ CH ₃	CH ₃	SCF ₃	F	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1871	H	CH ₃	OCHF ₂	F	H
A-1872	F	CH ₃	OCHF ₂	F	H
5 A-1873	Cl	CH ₃	OCHF ₂	F	H
A-1874	CH ₃	CH ₃	OCHF ₂	F	H
A-1875	CH ₂ CH ₃	CH ₃	OCHF ₂	F	H
A-1876	H	CH ₃	OCF ₃	F	H
10 A-1877	F	CH ₃	OCF ₃	F	H
A-1878	Cl	CH ₃	OCF ₃	F	H
A-1879	CH ₃	CH ₃	OCF ₃	F	H
A-1880	CH ₂ CH ₃	CH ₃	OCF ₃	F	H
A-1881	H	CH ₃	F	Cl	H
15 A-1882	F	CH ₃	F	Cl	H
A-1883	Cl	CH ₃	F	Cl	H
A-1884	CH ₃	CH ₃	F	Cl	H
A-1885	CH ₂ CH ₃	CH ₃	F	Cl	H
20 A-1886	H	CH ₃	Cl	Cl	H
A-1887	F	CH ₃	Cl	Cl	H
A-1888	Cl	CH ₃	Cl	Cl	H
A-1889	CH ₃	CH ₃	Cl	Cl	H
25 A-1890	CH ₂ CH ₃	CH ₃	Cl	Cl	H
A-1891	H	CH ₃	CHF ₂	Cl	H
A-1892	F	CH ₃	CHF ₂	Cl	H
A-1893	Cl	CH ₃	CHF ₂	Cl	H
30 A-1894	CH ₃	CH ₃	CHF ₂	Cl	H
A-1895	CH ₂ CH ₃	CH ₃	CHF ₂	Cl	H
A-1896	H	CH ₃	CF ₃	Cl	H
A-1897	F	CH ₃	CF ₃	Cl	H
A-1898	Cl	CH ₃	CF ₃	Cl	H
35 A-1899	CH ₃	CH ₃	CF ₃	Cl	H
A-1900	CH ₂ CH ₃	CH ₃	CF ₃	Cl	H
A-1901	H	CH ₃	SCHF ₂	Cl	H
A-1902	F	CH ₃	SCHF ₂	Cl	H
40 A-1903	Cl	CH ₃	SCHF ₂	Cl	H
A-1904	CH ₃	CH ₃	SCHF ₂	Cl	H
A-1905	CH ₂ CH ₃	CH ₃	SCHF ₂	Cl	H
A-1906	H	CH ₃	SCF ₃	Cl	H
45 A-1907	F	CH ₃	SCF ₃	Cl	H
A-1908	Cl	CH ₃	SCF ₃	Cl	H
A-1909	CH ₃	CH ₃	SCF ₃	Cl	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-1910	CH ₂ CH ₃	CH ₃	SCF ₃	Cl	H
	A-1911	H	CH ₃	OCHF ₂	Cl	H
	A-1912	F	CH ₃	OCHF ₂	Cl	H
	A-1913	Cl	CH ₃	OCHF ₂	Cl	H
	A-1914	CH ₃	CH ₃	OCHF ₂	Cl	H
10	A-1915	CH ₂ CH ₃	CH ₃	OCHF ₂	Cl	H
	A-1916	H	CH ₃	OCF ₃	Cl	H
	A-1917	F	CH ₃	OCF ₃	Cl	H
	A-1918	Cl	CH ₃	OCF ₃	Cl	H
	A-1919	CH ₃	CH ₃	OCF ₃	Cl	H
15	A-1920	CH ₂ CH ₃	CH ₃	OCF ₃	Cl	H
	A-1921	H	CH ₃	F	CHF ₂	H
	A-1922	F	CH ₃	F	CHF ₂	H
	A-1923	Cl	CH ₃	F	CHF ₂	H
	A-1924	CH ₃	CH ₃	F	CHF ₂	H
20	A-1925	CH ₂ CH ₃	CH ₃	F	CHF ₂	H
	A-1926	H	CH ₃	Cl	CHF ₂	H
	A-1927	F	CH ₃	Cl	CHF ₂	H
	A-1928	Cl	CH ₃	Cl	CHF ₂	H
	A-1929	CH ₃	CH ₃	Cl	CHF ₂	H
25	A-1930	CH ₂ CH ₃	CH ₃	Cl	CHF ₂	H
	A-1931	H	CH ₃	CHF ₂	CHF ₂	H
	A-1932	F	CH ₃	CHF ₂	CHF ₂	H
	A-1933	Cl	CH ₃	CHF ₂	CHF ₂	H
	A-1934	CH ₃	CH ₃	CHF ₂	CHF ₂	H
30	A-1935	CH ₂ CH ₃	CH ₃	CHF ₂	CHF ₂	H
	A-1936	H	CH ₃	CF ₃	CHF ₂	H
	A-1937	F	CH ₃	CF ₃	CHF ₂	H
	A-1938	Cl	CH ₃	CF ₃	CHF ₂	H
	A-1939	CH ₃	CH ₃	CF ₃	CHF ₂	H
35	A-1940	CH ₂ CH ₃	CH ₃	CF ₃	CHF ₂	H
	A-1941	H	CH ₃	SCHF ₂	CHF ₂	H
	A-1942	F	CH ₃	SCHF ₂	CHF ₂	H
	A-1943	Cl	CH ₃	SCHF ₂	CHF ₂	H
	A-1944	CH ₃	CH ₃	SCHF ₂	CHF ₂	H
40	A-1945	CH ₂ CH ₃	CH ₃	SCHF ₂	CHF ₂	H
	A-1946	H	CH ₃	SCF ₃	CHF ₂	H
	A-1947	F	CH ₃	SCF ₃	CHF ₂	H
	A-1948	Cl	CH ₃	SCF ₃	CHF ₂	H

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1949	CH ₃	CH ₃	SCF ₃	CHF ₂	H
A-1950	CH ₂ CH ₃	CH ₃	SCF ₃	CHF ₂	H
5 A-1951	H	CH ₃	OCHF ₂	CHF ₂	H
A-1952	F	CH ₃	OCHF ₂	CHF ₂	H
A-1953	Cl	CH ₃	OCHF ₂	CHF ₂	H
A-1954	CH ₃	CH ₃	OCHF ₂	CHF ₂	H
10 A-1955	CH ₂ CH ₃	CH ₃	OCHF ₂	CHF ₂	H
A-1956	H	CH ₃	OCF ₃	CHF ₂	H
A-1957	F	CH ₃	OCF ₃	CHF ₂	H
A-1958	Cl	CH ₃	OCF ₃	CHF ₂	H
A-1959	CH ₃	CH ₃	OCF ₃	CHF ₂	H
15 A-1960	CH ₂ CH ₃	CH ₃	OCF ₃	CHF ₂	H
A-1961	H	CH ₃	F	CF ₃	H
A-1962	F	CH ₃	F	CF ₃	H
A-1963	Cl	CH ₃	F	CF ₃	H
20 A-1964	CH ₃	CH ₃	F	CF ₃	H
A-1965	CH ₂ CH ₃	CH ₃	F	CF ₃	H
A-1966	H	CH ₃	Cl	CF ₃	H
A-1967	F	CH ₃	Cl	CF ₃	H
25 A-1968	Cl	CH ₃	Cl	CF ₃	H
A-1969	CH ₃	CH ₃	Cl	CF ₃	H
A-1970	CH ₂ CH ₃	CH ₃	Cl	CF ₃	H
A-1971	H	CH ₃	CHF ₂	CF ₃	H
30 A-1972	F	CH ₃	CHF ₂	CF ₃	H
A-1973	Cl	CH ₃	CHF ₂	CF ₃	H
A-1974	CH ₃	CH ₃	CHF ₂	CF ₃	H
A-1975	CH ₂ CH ₃	CH ₃	CHF ₂	CF ₃	H
A-1976	H	CH ₃	CF ₃	CF ₃	H
35 A-1977	F	CH ₃	CF ₃	CF ₃	H
A-1978	Cl	CH ₃	CF ₃	CF ₃	H
A-1979	CH ₃	CH ₃	CF ₃	CF ₃	H
A-1980	CH ₂ CH ₃	CH ₃	CF ₃	CF ₃	H
40 A-1981	H	CH ₃	SCHF ₂	CF ₃	H
A-1982	F	CH ₃	SCHF ₂	CF ₃	H
A-1983	Cl	CH ₃	SCHF ₂	CF ₃	H
A-1984	CH ₃	CH ₃	SCHF ₂	CF ₃	H
45 A-1985	CH ₂ CH ₃	CH ₃	SCHF ₂	CF ₃	H
A-1986	H	CH ₃	SCF ₃	CF ₃	H
A-1987	F	CH ₃	SCF ₃	CF ₃	H

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-1988	Cl	CH ₃	SCF ₃	CF ₃	H
A-1989	CH ₃	CH ₃	SCF ₃	CF ₃	H
5 A-1990	CH ₂ CH ₃	CH ₃	SCF ₃	CF ₃	H
A-1991	H	CH ₃	OCHF ₂	CF ₃	H
A-1992	F	CH ₃	OCHF ₂	CF ₃	H
A-1993	Cl	CH ₃	OCHF ₂	CF ₃	H
A-1994	CH ₃	CH ₃	OCHF ₂	CF ₃	H
10 A-1995	CH ₂ CH ₃	CH ₃	OCHF ₂	CF ₃	H
A-1996	H	CH ₃	OCF ₃	CF ₃	H
A-1997	F	CH ₃	OCF ₃	CF ₃	H
A-1998	Cl	CH ₃	OCF ₃	CF ₃	H
15 A-1999	CH ₃	CH ₃	OCF ₃	CF ₃	H
A-2000	CH ₂ CH ₃	CH ₃	OCF ₃	CF ₃	H
A-2001	H	CH ₃	F	H	F
A-2002	F	CH ₃	F	H	F
20 A-2003	Cl	CH ₃	F	H	F
A-2004	CH ₃	CH ₃	F	H	F
A-2005	CH ₂ CH ₃	CH ₃	F	H	F
A-2006	H	CH ₃	Cl	H	F
25 A-2007	F	CH ₃	Cl	H	F
A-2008	Cl	CH ₃	Cl	H	F
A-2009	CH ₃	CH ₃	Cl	H	F
A-2010	CH ₂ CH ₃	CH ₃	Cl	H	F
A-2011	H	CH ₃	CHF ₂	H	F
30 A-2012	F	CH ₃	CHF ₂	H	F
A-2013	Cl	CH ₃	CHF ₂	H	F
A-2014	CH ₃	CH ₃	CHF ₂	H	F
A-2015	CH ₂ CH ₃	CH ₃	CHF ₂	H	F
35 A-2016	H	CH ₃	CF ₃	H	F
A-2017	F	CH ₃	CF ₃	H	F
A-2018	Cl	CH ₃	CF ₃	H	F
A-2019	CH ₃	CH ₃	CF ₃	H	F
40 A-2020	CH ₂ CH ₃	CH ₃	CF ₃	H	F
A-2021	H	CH ₃	SCHF ₂	H	F
A-2022	F	CH ₃	SCHF ₂	H	F
A-2023	Cl	CH ₃	SCHF ₂	H	F
A-2024	CH ₃	CH ₃	SCHF ₂	H	F
45 A-2025	CH ₂ CH ₃	CH ₃	SCHF ₂	H	F
A-2026	H	CH ₃	SCF ₃	H	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-2027	F	CH ₃	SCF ₃	H	F
	A-2028	Cl	CH ₃	SCF ₃	H	F
	A-2029	CH ₃	CH ₃	SCF ₃	H	F
	A-2030	CH ₂ CH ₃	CH ₃	SCF ₃	H	F
	A-2031	H	CH ₃	OCHF ₂	H	F
10	A-2032	F	CH ₃	OCHF ₂	H	F
	A-2033	Cl	CH ₃	OCHF ₂	H	F
	A-2034	CH ₃	CH ₃	OCHF ₂	H	F
	A-2035	CH ₂ CH ₃	CH ₃	OCHF ₂	H	F
	A-2036	H	CH ₃	OCF ₃	H	F
15	A-2037	F	CH ₃	OCF ₃	H	F
	A-2038	Cl	CH ₃	OCF ₃	H	F
	A-2039	CH ₃	CH ₃	OCF ₃	H	F
	A-2040	CH ₂ CH ₃	CH ₃	OCF ₃	H	F
	A-2041	H	CH ₃	F	F	F
20	A-2042	F	CH ₃	F	F	F
	A-2043	Cl	CH ₃	F	F	F
	A-2044	CH ₃	CH ₃	F	F	F
	A-2045	CH ₂ CH ₃	CH ₃	F	F	F
	A-2046	H	CH ₃	Cl	F	F
25	A-2047	F	CH ₃	Cl	F	F
	A-2048	Cl	CH ₃	Cl	F	F
	A-2049	CH ₃	CH ₃	Cl	F	F
	A-2050	CH ₂ CH ₃	CH ₃	Cl	F	F
	A-2051	H	CH ₃	CHF ₂	F	F
30	A-2052	F	CH ₃	CHF ₂	F	F
	A-2053	Cl	CH ₃	CHF ₂	F	F
	A-2054	CH ₃	CH ₃	CHF ₂	F	F
	A-2055	CH ₂ CH ₃	CH ₃	CHF ₂	F	F
	A-2056	H	CH ₃	CF ₃	F	F
35	A-2057	F	CH ₃	CF ₃	F	F
	A-2058	Cl	CH ₃	CF ₃	F	F
	A-2059	CH ₃	CH ₃	CF ₃	F	F
	A-2060	CH ₂ CH ₃	CH ₃	CF ₃	F	F
	A-2061	H	CH ₃	SCHF ₂	F	F
40	A-2062	F	CH ₃	SCHF ₂	F	F
	A-2063	Cl	CH ₃	SCHF ₂	F	F
	A-2064	CH ₃	CH ₃	SCHF ₂	F	F
	A-2065	CH ₂ CH ₃	CH ₃	SCHF ₂	F	F

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-2066	H	CH ₃	SCF ₃	F	F
A-2067	F	CH ₃	SCF ₃	F	F
5 A-2068	Cl	CH ₃	SCF ₃	F	F
A-2069	CH ₃	CH ₃	SCF ₃	F	F
A-2070	CH ₂ CH ₃	CH ₃	SCF ₃	F	F
A-2071	H	CH ₃	OCHF ₂	F	F
10 A-2072	F	CH ₃	OCHF ₂	F	F
A-2073	Cl	CH ₃	OCHF ₂	F	F
A-2074	CH ₃	CH ₃	OCHF ₂	F	F
A-2075	CH ₂ CH ₃	CH ₃	OCHF ₂	F	F
A-2076	H	CH ₃	OCF ₃	F	F
15 A-2077	F	CH ₃	OCF ₃	F	F
A-2078	Cl	CH ₃	OCF ₃	F	F
A-2079	CH ₃	CH ₃	OCF ₃	F	F
A-2080	CH ₂ CH ₃	CH ₃	OCF ₃	F	F
20 A-2081	H	CH ₃	F	Cl	F
A-2082	F	CH ₃	F	Cl	F
A-2083	Cl	CH ₃	F	Cl	F
A-2084	CH ₃	CH ₃	F	Cl	F
25 A-2085	CH ₂ CH ₃	CH ₃	F	Cl	F
A-2086	H	CH ₃	Cl	Cl	F
A-2087	F	CH ₂	Cl	Cl	F
A-2088	Cl	CH ₃	Cl	Cl	F
A-2089	CH ₃	CH ₃	Cl	Cl	F
30 A-2090	CH ₂ CH ₃	CH ₃	Cl	Cl	F
A-2091	H	CH ₃	CHF ₂	Cl	F
A-2092	F	CH ₃	CHF ₂	Cl	F
A-2093	Cl	CH ₃	CHF ₂	Cl	F
35 A-2094	CH ₃	CH ₃	CHF ₂	Cl	F
A-2095	CH ₂ CH ₃	CH ₃	CHF ₂	Cl	F
A-2096	H	CH ₃	CF ₃	Cl	F
A-2097	F	CH ₃	CF ₃	Cl	F
40 A-2098	Cl	CH ₃	CF ₃	Cl	F
A-2099	CH ₃	CH ₃	CF ₃	Cl	F
A-2100	CH ₂ CH ₃	CH ₃	CF ₃	Cl	F
A-2101	H	CH ₃	SCHF ₂	Cl	F
45 A-2102	F	CH ₃	SCHF ₂	Cl	F
A-2103	Cl	CH ₃	SCHF ₂	Cl	F
A-2104	CH ₃	CH ₃	SCHF ₂	Cl	F

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-2105	CH ₂ CH ₃	CH ₃	SCHF ₂	Cl	F
	A-2106	H	CH ₃	SCF ₃	Cl	F
	A-2107	F	CH ₃	SCF ₃	Cl	F
	A-2108	Cl	CH ₃	SCF ₃	Cl	F
	A-2109	CH ₃	CH ₃	SCF ₃	Cl	F
10	A-2110	CH ₂ CH ₃	CH ₃ C	SCF ₃	Cl	F
	A-2111	H	CH ₃ C	OCHF ₂	Cl	F
	A-2112	F	CH ₃	OCHF ₂	Cl	F
	A-2113	Cl	CH ₃	OCHF ₂	Cl	F
	A-2114	CH ₃	CH ₃ C	OCHF ₂	Cl	F
15	A-2115	CH ₂ CH ₃	CH ₃ C	OCHF ₂	Cl	F
	A-2116	H	CH ₃	OCF ₃	Cl	F
	A-2117	F	CH ₃	OCF ₃	Cl	F
	A-2118	Cl	CH ₃	OCF ₃	Cl	F
	A-2119	CH ₃	CH ₃	OCF ₃	Cl	F
20	A-2120	CH ₂ CH ₃	CH ₃	OCF ₃	Cl	F
	A-2121	H	CH ₃	F	CHF ₂	F
	A-2122	F	CH ₃	F	CHF ₂	F
	A-2123	Cl	CH ₃	F	CHF ₂	F
	A-2124	CH ₃	CH ₃	F	CHF ₂	F
25	A-2125	CH ₂ CH ₃	CH ₃	F	CHF ₂	F
	A-2126	H	CH ₃	Cl	CHF ₂	F
	A-2127	F	CH ₃	Cl	CHF ₂	F
	A-2128	Cl	CH ₃	Cl	CHF ₂	F
	A-2129	CH ₃	CH ₃	Cl	CHF ₂	F
30	A-2130	CH ₂ CH ₃	CH ₃	Cl	CHF ₂	F
	A-2131	H	CH ₃	CHF ₂	CHF ₂	F
	A-2132	F	CH ₃	CHF ₂	CHF ₂	F
	A-2133	Cl	CH ₃	CHF ₂	CHF ₂	F
	A-2134	CH ₃	CH ₃	CHF ₂	CHF ₂	F
35	A-2135	CH ₂ CH ₃	CH ₃	CHF ₂	CHF ₂	F
	A-2136	H	CH ₃	CF ₃	CHF ₂	F
	A-2137	F	CH ₃	CF ₃	CHF ₂	F
	A-2138	Cl	CH ₃	CF ₃	CHF ₂	F
	A-2139	CH ₃	CH ₃	CF ₃	CHF ₂	F
40	A-2140	CH ₂ CH ₃	CH ₃	CF ₃	CHF ₂	F
	A-2141	H	CH ₃	SCHF ₂	CHF ₂	F
	A-2142	F	CH ₃	SCHF ₂	CHF ₂	F
	A-2143	Cl	CH ₃	SCHF ₂	CHF ₂	F
	45					

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-2144	CH ₃	CH ₃	SCHF ₂	CHF ₂	F
A-2145	CH ₂ CH ₃	CH ₃	SCHF ₂	CHF ₂	F
5 A-2146	H	CH ₃	SCF ₃	CHF ₂	F
A-2147	F	CH ₃	SCF ₃	CHF ₂	F
A-2148	Cl	CH ₃	SCF ₃	CHF ₂	F
A-2149	CH ₃	CH ₃	SCF ₃	CHF ₂	F
10 A-2150	CH ₂ CH ₃	CH ₃	SCF ₃	CHF ₂	F
A-2151	H	CH ₃	OCHF ₂	CHF ₂	F
A-2152	F	CH ₃	OCHF ₂	CHF ₂	F
A-2153	Cl	CH ₃	OCHF ₂	CHF ₂	F
A-2154	CH ₃	CH ₃	OCHF ₂	CHF ₂	F
15 A-2155	CH ₂ CH ₃	CH ₃	OCHF ₂	CHF ₂	F
A-2156	H	CH ₃	OCF ₃	CHF ₂	F
A-2157	F	CH ₃	OCF ₃	CHF ₂	F
A-2158	Cl	CH ₃	OCF ₃	CHF ₂	F
20 A-2159	CH ₃	CH ₃	OCF ₃	CHF ₂	F
A-2160	CH ₂ CH ₃	CH ₃	OCF ₃	CHF ₂	F
A-2161	H	CH ₃	F	CF ₃	F
A-2162	F	CH ₃	F	CF ₃	F
A-2163	Cl	CH ₃	F	CF ₃	F
25 A-2164	CH ₃	CH ₃	F	CF ₃	F
A-2165	CH ₂ CH ₃	CH ₃	F	CF ₃	F
A-2166	H	CH ₃	Cl	CF ₃	F
A-2167	F	CH ₃	Cl	CF ₃	F
30 A-2168	Cl	CH ₃	Cl	CF ₃	F
A-2169	CH ₃	CH ₃	Cl	CF ₃	F
A-2170	CH ₂ CH ₃	CH ₃	Cl	CF ₃	F
A-2171	H	CH ₃	CHF ₂	CF ₃	F
35 A-2172	F	CH ₃	CHF ₂	CF ₃	F
A-2173	Cl	CH ₃	CHF ₂	CF ₃	F
A-2174	CH ₃	CH ₃	CHF ₂	CF ₃	F
A-2175	CH ₂ CH ₃	CH ₃	CHF ₂	CF ₃	F
40 A-2176	H	CH ₃	CF ₃	CF ₃	F
A-2177	F	CH ₃	CF ₃	CF ₃	F
A-2178	Cl	CH ₃	CF ₃	CF ₃	F
A-2179	CH ₃	CH ₃	CF ₃	CF ₃	F
45 A-2180	CH ₂ CH ₃	CH ₃	CF ₃	CF ₃	F
A-2181	H	CH ₃	SCHF ₂	CF ₃	F
A-2182	F	CH ₃	SCHF ₂	CF ₃	F

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-2183	Cl	CH ₃	SCHF ₂	CF ₃	F
A-2184	CH ₃	CH ₃	SCHF ₂	CF ₃	F
5 A-2185	CH ₂ CH ₃	CH ₃	SCHF ₂	CF ₃	F
A-2186	H	CH ₃	SCF ₃	CF ₃	F
A-2187	F	CH ₃	SCF ₃	CF ₃	F
A-2188	Cl	CH ₃	SCF ₃	CF ₃	F
A-2189	CH ₃	CH ₃	SCF ₃	CF ₃	F
10 A-2190	CH ₂ CH ₃	CH ₃	SCF ₃	CF ₃	F
A-2191	H	CH ₃	OCHF ₂	CF ₃	F
A-2192	F	CH ₃	OCHF ₂	CF ₃	F
A-2193	Cl	CH ₃	OCHF ₂	CF ₃	F
15 A-2194	CH ₃	CH ₃	OCHF ₂	CF ₃	F
A-2195	CH ₂ CH ₃	CH ₃	OCHF ₂	CF ₃	F
A-2196	H	CH ₃	OCF ₃	CF ₃	F
A-2197	F	CH ₃	OCF ₃	CF ₃	F
20 A-2198	Cl	CH ₃	OCF ₃	CF ₃	F
A-2199	CH ₃	CH ₃	OCF ₃	CF ₃	F
A-2200	CH ₂ CH ₃	CH ₃	OCF ₃	CF ₃	F
A-2201	H	CH ₃	F	H	Cl
25 A-2202	F	CH ₃	F	H	Cl
A-2203	Cl	CH ₃	F	H	Cl
A-2204	CH ₃	CH ₃	F	H	Cl
A-2205	CH ₂ CH ₃	CH ₃	F	H	Cl
30 A-2206	H	CH ₃	Cl	H	Cl
A-2207	F	CH ₃	Cl	H	Cl
A-2208	Cl	CH ₃	Cl	H	Cl
A-2209	CH ₃	CH ₃	Cl	H	Cl
A-2210	CH ₂ CH ₃	CH ₃	Cl	H	Cl
35 A-2211	H	CH ₃	CHF ₂	H	Cl
A-2212	F	CH ₃	CHF ₂	H	Cl
A-2213	Cl	CH ₃	CHF ₂	H	Cl
A-2214	CH ₃	CH ₃	CHF ₂	H	Cl
40 A-2215	CH ₂ CH ₃	CH ₃	CHF ₂	H	Cl
A-2216	H	CH ₃	CF ₃	H	Cl
A-2217	F	CH ₃	CF ₃	H	Cl
A-2218	Cl	CH ₃	CF ₃	H	Cl
45 A-2219	CH ₃	CH ₃	CF ₃	H	Cl
A-2220	CH ₂ CH ₃	CH ₃	CF ₃	H	Cl
A-2221	H	CH ₃	SCHF ₂	H	Cl

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-2222	F	CH ₃	SCHF ₂	H	Cl
A-2223	Cl	CH ₃	SCHF ₂	H	Cl
5 A-2224	CH ₃	CH ₃	SCHF ₂	H	Cl
A-2225	CH ₂ CH ₃	CH ₃	SCHF ₂	H	Cl
A-2226	H	CH ₃	SCF ₃	H	Cl
A-2227	F	CH ₃	SCF ₃	H	Cl
10 A-2228	Cl	CH ₃	SCF ₃	H	Cl
A-2229	CH ₃	CH ₃	SCF ₃	H	Cl
A-2230	CH ₂ CH ₃	CH ₃	SCF ₃	H	Cl
A-2231	H	CH ₃	OCHF ₂	H	Cl
A-2232	F	CH ₃	OCHF ₂	H	Cl
15 A-2233	Cl	CH ₃	OCHF ₂	H	Cl
A-2234	CH ₃	CH ₃	OCHF ₂	H	Cl
A-2235	CH ₂ CH ₃	CH ₃	OCHF ₂	H	Cl
A-2236	H	CH ₃	OCF ₃	H	Cl
20 A-2237	F	CH ₃	OCF ₃	H	Cl
A-2238	Cl	CH ₃	OCF ₃	H	Cl
A-2239	CH ₃	CH ₃	OCF ₃	H	Cl
A-2240	CH ₂ CH ₃	CH ₃	OCF ₃	H	Cl
25 A-2241	H	CH ₃	F	F	Cl
A-2242	F	CH ₃	F	F	Cl
A-2243	Cl	CH ₃	F	F	Cl
A-2244	CH ₃	CH ₃	F	F	Cl
A-2245	CH ₂ CH ₃	CH ₃	F	F	Cl
30 A-2246	H	CH ₃	Cl	F	Cl
A-2247	F	CH ₃	Cl	F	Cl
A-2248	Cl	CH ₃	Cl	F	Cl
A-2249	CH ₃	CH ₃	Cl	F	Cl
35 A-2250	CH ₂ CH ₃	CH ₃	Cl	F	Cl
A-2251	H	CH ₃	CHF ₂	F	Cl
A-2252	F	CH ₃	CHF ₂	F	Cl
A-2253	Cl	CH ₃	CHF ₂	F	Cl
40 A-2254	CH ₃	CH ₃	CHF ₂	F	Cl
A-2255	CH ₂ CH ₃	CH ₃	CHF ₂	F	Cl
A-2256	H	CH ₃	CF ₃	F	Cl
A-2257	F	CH ₃	CF ₃	F	Cl
45 A-2258	Cl	CH ₃	CF ₃	F	Cl
A-2259	CH ₃	CH ₃	CF ₃	F	Cl
A-2260	CH ₂ CH ₃	CH ₃	CF ₃	F	Cl

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³	
5	A-2261	H	CH ₃	SCHF ₂	F	Cl
	A-2262	F	CH ₃	SCHF ₂	F	Cl
	A-2263	Cl	CH ₃	SCHF ₂	F	Cl
	A-2264	CH ₃	CH ₃	SCHF ₂	F	Cl
	A-2265	CH ₂ CH ₃	CH ₃	SCHF ₂	F	Cl
10	A-2266	H	CH ₃	SCF ₃	F	Cl
	A-2267	F	CH ₃	SCF ₃	F	Cl
	A-2268	Cl	CH ₃	SCF ₃	F	Cl
	A-2269	CH ₃	CH ₃	SCF ₃	F	Cl
	A-2270	CH ₂ CH ₃	CH ₃	SCF ₃	F	Cl
15	A-2271	H	CH ₃	OCHF ₂	F	Cl
	A-2272	F	CH ₃	OCHF ₂	F	Cl
	A-2273	Cl	CH ₃	OCHF ₂	F	Cl
	A-2274	CH ₃	CH ₃	OCHF ₂	F	Cl
	A-2275	CH ₂ CH ₃	CH ₃	OCHF ₂	F	Cl
20	A-2276	H	CH ₃	OCF ₃	F	Cl
	A-2277	F	CH ₃	OCF ₃	F	Cl
	A-2278	Cl	CH ₃	OCF ₃	F	Cl
	A-2279	CH ₃	CH ₃	OCF ₃	F	Cl
	A-2280	CH ₂ CH ₃	CH ₃	OCF ₃	F	Cl
25	A-2281	H	CH ₃	F	Cl	Cl
	A-2282	F	CH ₃	F	Cl	Cl
	A-2283	Cl	CH ₃	F	Cl	Cl
	A-2284	CH ₃	CH ₃	F	Cl	Cl
	A-2285	CH ₂ CH ₃	CH ₃	F	Cl	Cl
30	A-2286	H	CH ₃	Cl	Cl	Cl
	A-2287	F	CH ₃	Cl	Cl	Cl
	A-2288	Cl	CH ₃	Cl	Cl	Cl
	A-2289	CH ₃	CH ₃	Cl	Cl	Cl
	A-2290	CH ₂ CH ₃	CH ₃	Cl	Cl	Cl
35	A-2291	H	CH ₃	CHF ₂	Cl	Cl
	A-2292	F	CH ₃	CHF ₂	Cl	Cl
	A-2293	Cl	CH ₃	CHF ₂	Cl	Cl
	A-2294	CH ₃	CH ₃	CHF ₂	Cl	Cl
	A-2295	CH ₂ CH ₃	CH ₃	CHF ₂	Cl	Cl
40	A-2296	H	CH ₃	CF ₃	Cl	Cl
	A-2297	F	CH ₃	CF ₃	Cl	Cl
	A-2298	Cl	CH ₃	CF ₃	Cl	Cl
	A-2299	CH ₃	CH ₃	CF ₃	Cl	Cl
	A-2299	CH ₃	CH ₃	CF ₃	Cl	Cl

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No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-2300	CH ₂ CH ₃	CH ₃	CF ₃	Cl	Cl
A-2301	H	CH ₃	SCHF ₂	Cl	Cl
5 A-2302	F	CH ₃	SCHF ₂	Cl	Cl
A-2303	Cl	CH ₃	SCHF ₂	Cl	Cl
A-2304	CH ₃	CH ₃	SCHF ₂	Cl	Cl
A-2305	CH ₂ CH ₃	CH ₃	SCHF ₂	Cl	Cl
10 A-2306	H	CH ₃	SCF ₃	Cl	Cl
A-2307	F	CH ₃	SCF ₃	Cl	Cl
A-2308	Cl	CH ₃	SCF ₃	Cl	Cl
A-2309	CH ₃	CH ₃	SCF ₃	Cl	Cl
A-2310	CH ₂ CH ₃	CH ₃	SCF ₃	Cl	Cl
15 A-2311	H	CH ₃	OCHF ₂	Cl	Cl
A-2312	F	CH ₃	OCHF ₂	Cl	Cl
A-2313	Cl	CH ₃	OCHF ₂	Cl	Cl
A-2314	CH ₃	CH ₃	OCHF ₂	Cl	Cl
20 A-2315	CH ₂ CH ₃	CH ₃	OCHF ₂	Cl	Cl
A-2316	H	CH ₃	OCF ₃	Cl	Cl
A-2317	F	CH ₃	OCF ₃	Cl	Cl
A-2318	Cl	CH ₃	OCF ₃	Cl	Cl
25 A-2319	CH ₃	CH ₃	OCF ₃	Cl	Cl
A-2320	CH ₂ CH ₃	CH ₃	OCF ₃	Cl	Cl
A-2321	H	CH ₃	F	CHF ₂	Cl
A-2322	F	CH ₃	F	CHF ₂	Cl
A-2323	Cl	CH ₃	F	CHF ₂	Cl
30 A-2324	CH ₃	CH ₃	F	CHF ₂	Cl
A-2325	CH ₂ CH ₃	CH ₃	F	CHF ₂	Cl
A-2326	H	CH ₃	Cl	CHF ₂	Cl
A-2327	F	CH ₃	Cl	CHF ₂	Cl
35 A-2328	Cl	CH ₃	Cl	CHF ₂	Cl
A-2329	CH ₃	CH ₃	Cl	CHF ₂	Cl
A-2330	CH ₂ CH ₃	CH ₃	Cl	CHF ₂	Cl
A-2331	H	CH ₃	CHF ₂	CHF ₂	Cl
40 A-2332	F	CH ₃	CHF ₂	CHF ₂	Cl
A-2333	Cl	CH ₃	CHF ₂	CHF ₂	Cl
A-2334	CH ₃	CH ₃	CHF ₂	CHF ₂	Cl
A-2335	CH ₂ CH ₃	CH ₃	CHF ₂	CHF ₂	Cl
45 A-2336	H	CH ₃	CF ₃	CHF ₂	Cl
A-2337	F	CH ₃	CF ₃	CHF ₂	Cl
A-2338	Cl	CH ₃	CF ₃	CHF ₂	Cl

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-2339	CH ₃	CH ₃	CF ₃	CHF ₂	Cl
A-2340	CH ₂ CH ₃	CH ₃	CF ₃	CHF ₂	Cl
5 A-2341	H	CH ₃	SCHF ₂	CHF ₂	Cl
A-2342	F	CH ₃	SCHF ₂	CHF ₂	Cl
A-2343	Cl	CH ₃	SCHF ₂	CHF ₂	Cl
A-2344	CH ₃	CH ₃	SCHF ₂	CHF ₂	Cl
10 A-2345	CH ₂ CH ₃	CH ₃	SCHF ₂	CHF ₂	Cl
A-2346	H	CH ₃	SCF ₃	CHF ₂	Cl
A-2347	F	CH ₃	SCF ₃	CHF ₂	Cl
A-2348	Cl	CH ₃	SCF ₃	CHF ₂	Cl
A-2349	CH ₃	CH ₃	SCF ₃	CHF ₂	Cl
15 A-2350	CH ₂ CH ₃	CH ₃	SCF ₃	CHF ₂	Cl
A-2351	H	CH ₃	OCHF ₂	CHF ₂	Cl
A-2352	F	CH ₃	OCHF ₂	CHF ₂	Cl
A-2353	Cl	CH ₃	OCHF ₂	CHF ₂	Cl
20 A-2354	CH ₃	CH ₃	OCHF ₂	CHF ₂	Cl
A-2355	CH ₂ CH ₃	CH ₃	OCHF ₂	CHF ₂	Cl
A-2356	H	CH ₃	OCF ₃	CHF ₂	Cl
A-2357	F	CH ₃	OCF ₃	CHF ₂	Cl
25 A-2358	Cl	CH ₃	OCF ₃	CHF ₂	Cl
A-2359	CH ₃	CH ₃	OCF ₃	CHF ₂	Cl
A-2360	CH ₂ CH ₃	CH ₃	OCF ₃	CHF ₂	Cl
A-2361	H	CH ₃	F	CF ₃	Cl
30 A-2362	F	CH ₃	F	CF ₃	Cl
A-2363	Cl	CH ₃	F	CF ₃	Cl
A-2364	CH ₃	CH ₃	F	CF ₃	Cl
A-2365	CH ₂ CH ₃	CH ₃	F	CF ₃	Cl
A-2366	H	CH ₃	Cl	CF ₃	Cl
35 A-2367	F	CH ₃	Cl	CF ₃	Cl
A-2368	Cl	CH ₃	Cl	CF ₃	Cl
A-2369	CH ₃	CH ₃	Cl	CF ₃	Cl
A-2370	CH ₂ CH ₃	CH ₃	Cl	CF ₃	Cl
40 A-2371	H	CH ₃	CHF ₂	CF ₃	Cl
A-2372	F	CH ₃	CHF ₂	CF ₃	Cl
A-2373	Cl	CH ₃	CHF ₂	CF ₃	Cl
A-2374	CH ₃	CH ₃	CHF ₂	CF ₃	Cl
45 A-2375	CH ₂ CH ₃	CH ₃	CHF ₂	CF ₃	Cl
A-2376	H	CH ₃	CF ₃	CF ₃	Cl
A-2377	F	CH ₃	CF ₃	CF ₃	Cl

100

No.	R ¹	R ²	R ¹¹	R ¹²	R ¹³
A-2378	Cl	CH ₃	CF ₃	CF ₃	Cl
A-2379	CH ₃	CH ₃	CF ₃	CF ₃	Cl
5 A-2380	CH ₂ CH ₃	CH ₃	CF ₃	CF ₃	Cl
A-2381	H	CH ₃	SCHF ₂	CF ₃	Cl
A-2382	F	CH ₃	SCHF ₂	CF ₃	Cl
A-2383	Cl	CH ₃	SCHF ₂	CF ₃	Cl
10 A-2384	CH ₃	CH ₃	SCHF ₂	CF ₃	Cl
A-2385	CH ₂ CH ₃	CH ₃	SCHF ₂	CF ₃	Cl
A-2386	H	CH ₃	SCF ₃	CF ₃	Cl
A-2387	F	CH ₃	SCF ₃	CF ₃	Cl
A-2388	Cl	CH ₃	SCF ₃	CF ₃	Cl
15 A-2389	CH ₃	CH ₃	SCF ₃	CF ₃	Cl
A-2390	CH ₂ CH ₃	CH ₃	SCF ₃	CF ₃	Cl
A-2391	H	CH ₃	OCHF ₂	CF ₃	Cl
A-2392	F	CH ₃	OCHF ₂	CF ₃	Cl
20 A-2393	Cl	CH ₃	OCHF ₂	CF ₃	Cl
A-2394	CH ₃	CH ₃	OCHF ₂	CF ₃	Cl
A-2395	CH ₂ CH ₃	CH ₃	OCHF ₂	CF ₃	Cl
A-2396	H	CH ₃	OCF ₃	CF ₃	Cl
25 A-2397	F	CH ₃	OCF ₃	CF ₃	Cl
A-2398	Cl	CH ₃	OCF ₃	CF ₃	Cl
A-2399	CH ₃	CH ₃	OCF ₃	CF ₃	Cl
A-2400	CH ₂ CH ₃	CH ₃	OCF ₃	CF ₃	Cl

30

35

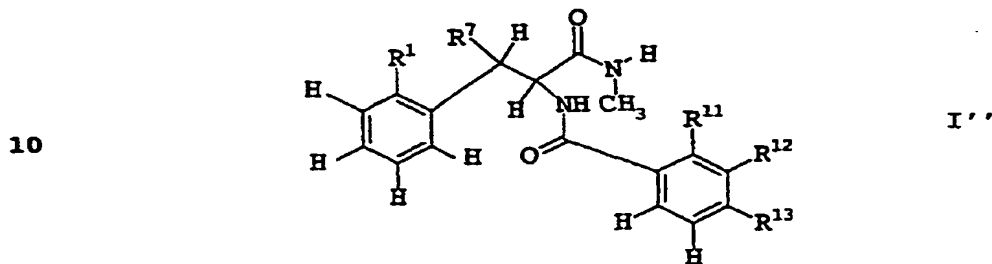
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101

With respect to their use, very particular preference is given to the compounds I'' (R², R³, R⁴, R⁵, R⁶, R⁹, R¹⁰, R¹⁴ and R¹⁵ are hydrogen and R⁸ is methyl)

5



15

and in which

R¹ is hydrogen, fluorine or methyl;

20 R⁷ is hydrogen, methyl or ethyl;

R¹¹ is chlorine;

R¹² is trifluoromethyl;

25

R^{13} is hydrogen.

With respect to their use, very particular preference is also given to the compounds I'' in which

30

R¹ is hydrogen, fluorine or methyl;

R⁷ is hydrogen, methyl or ethyl;

35 R¹¹ is trifluoromethyl;

R¹² is hydrogen;

R¹³ is fluorine.

40

As mentioned at the outset, the S enantiomers or S diastereomers, with reference to the α carbon atom of the compounds listed in tables 1 to 96 are preferred.

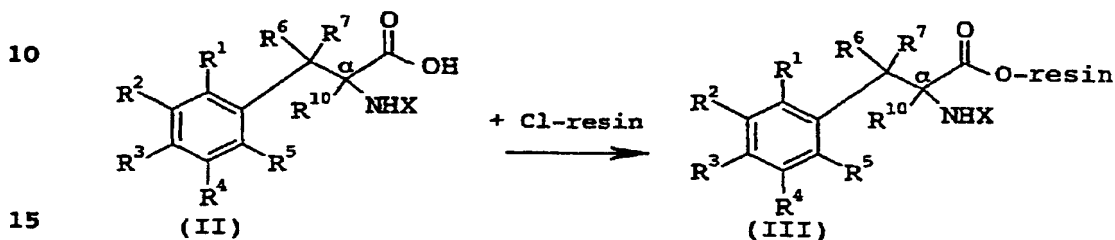
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102

The substituted phenylalanine derivatives of the formula I can be obtained by different routes, for example by solid-phase synthesis according to process 1 or 2:

5 Process 1:

A) Linking the phenylalanine derivative to a carrier resin



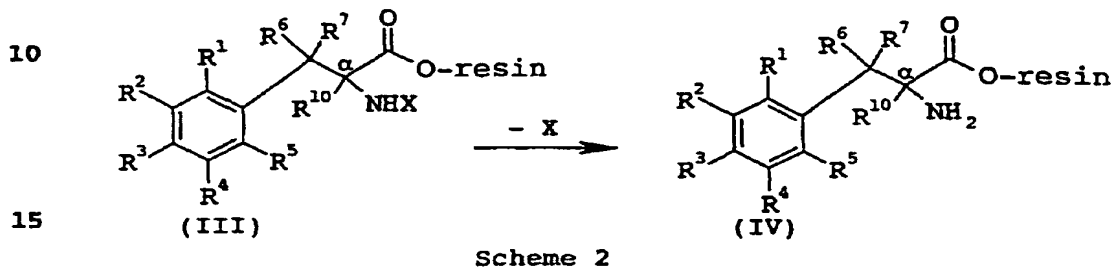
Scheme 1

How to attach amino acid derivatives to a carrier resin is known and described, for example, in Barlos K. et al., Int J Pept Protein Res 37 (1991), 513; Barlos K. et al., Int J Pept Protein Res 47 (1991), 148; Barlos K. et al., Tetrahedron Lett. 30 (1989), 3943; Barlos K. et al., Tetrahedron Lett. 32 (1991), 471; Chhabra S.R. et al., Tetrahedron Lett. 39 (1998), 1603. A phenylalanine derivative II protected at the nitrogen function by a protective group X, for example by a 9-fluorenylmethoxycarbonyl (Fmoc) protective group, a phenylmethoxycarbonyl (Cbz) group, a nitrobenzenesulfonyl (Nps) group or a 1,1-dimethylethoxycarbonyl (Boc) group, is, in an esterification, attached to a resin which carries hydroxyl groups (see Scheme 1). The preparation of compounds II is known and is carried out analogously to known methods as described, for example, in Barlos K. et al., Int J Pept Protein Res 37 (1991), 513; Barlos K. et al., Int J Pept Protein Res 47 (1991), 148; Barlos K. et al., Tetrahedron Lett. 30 (1989), 3943; Barlos K. et al., Tetrahedron Lett. 32 (1991), 471; Chhabra S.R. et al., Tetrahedron Lett. 39 (1998), 1603. Furthermore, a large number of compounds II is commercially available. Here, the esterification is preferably carried out in the presence of a base, the ratio of base to compound II being approximately 2:1. Examples of suitable bases are amines, such as ethyldiisopropylamine, triethylamine or N-methylmorpholine. Suitable resins are for example resins based on polystyrene and having Wang or trityl linkers. The reaction is generally carried out in an inert organic solvent, for example an aromatic hydrocarbon such as benzene or toluene, or in a chlorinated hydrocarbon such as dichloromethane, or in an aprotic dipolar organic solvent such as dimethylformamide (DMF),

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dimethylacetamide (DMA) or N-methylpyrrolidone (NMP), or in an ether such as methyl t-butyl ether, diethyl ether or tetrahydrofuran (THF). The reaction can be carried out at temperatures of from 0°C to the boiling point of the reaction mixture, preferably at room temperature.

B) Removal of the protective group X



In step B, the protective group X (see Scheme 2) is removed similarly to known methods, in the case of an Fmoc protective group by adding a base such as, for example, piperidine or 1,5-diazabicyclo[4.3.0]non-5-ene in an aprotic dipolar organic solvent such as dimethylformamide (DMF), dimethylacetamide (DMA) or N-methylpyrrolidone (NMP) in a ratio of 1:1 to 1:5, giving compounds IV. The reaction can be carried out at temperatures of from 0°C to the boiling point of the reaction mixture, preferably at room temperature.

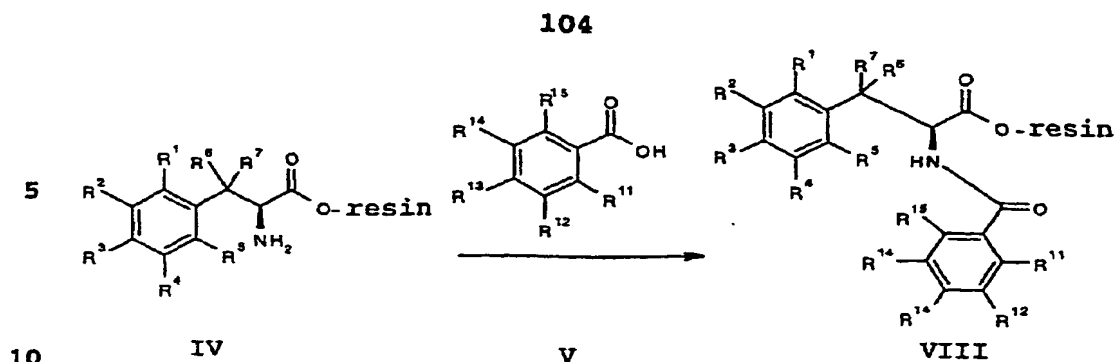
C) N-Acylation

30 The N-acylation of step C can be carried out a) using a substituted benzoic acid V (process variant C.1) or b) using a benzoic acid derivative, for example a substituted benzoyl halide VI (process variant C.2), similarly to known processes, as described, for example, in Neustadt B.R. et al., Tetrahedron Lett. 39 (1998), 5317.

C.1) N-Acylation using a substituted benzoic acid

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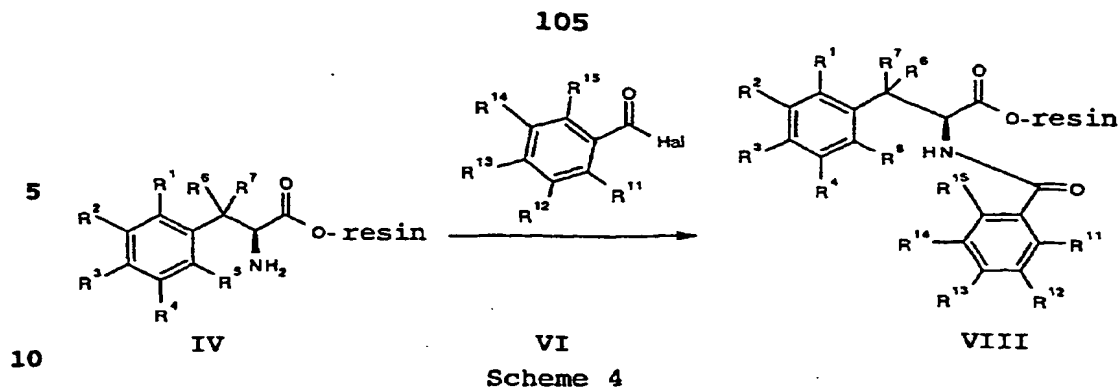
45



Scheme 3

Using compounds VI, compounds V can be converted into compounds VIII (see Scheme 3), for example by activating the carboxyl group of V with electrophilic reagents such as, for example, dicyclohexylcarbodiimide (DCC) or diisopropylcarbodiimide (DIC) in the presence of a catalytic amount of an organic base such as, for example, 4-dimethylaminopyridine or pyridine. If appropriate, further activation of the reaction can be achieved by using 1-hydroxybenzotriazole. The reaction is carried out until complete conversion is achieved, over a period of 4-12h at temperatures of from 0°C to the boiling point of the reaction mixture, preferably at room temperature, in an inert organic solvent such as, for example, an aromatic hydrocarbon, such as benzene or toluene, or in a chlorinated hydrocarbon, such as dichloromethane, or in organic solvents, such as dimethylformamide (DMF), dimethylacetamide (DMA) or N-methylpyrrolidone (NMP), methyl t-butyl ether, diethyl ether or tetrahydrofuran (THF). The compounds V can be prepared similarly to known processes, as described, for example, in Houben-Weyl, "Methoden der organischen Chemie" [Methods of Organic Chemistry], 4th edition, Ed. J. Talbe, New York 1985, pp. 193-585. Furthermore, a large number of compounds V is also commercially available.

C.2) N-Acylation using a substituted benzoyl halide

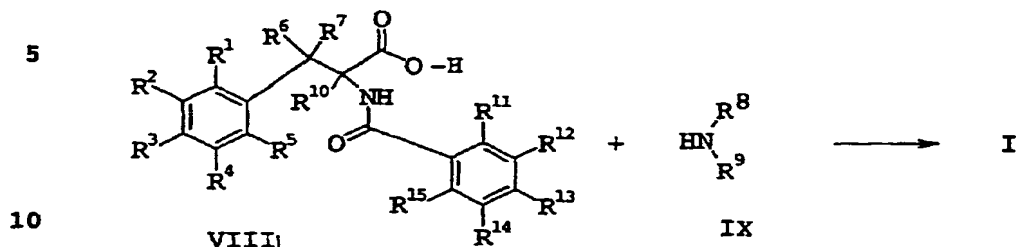


To prepare compound VIII, compound IV can be reacted with a substituted benzoyl halide VI, by adding an organic base such as triethylamine, N-methylmorpholine or diisopropylethylamine (DIPEA) or else pyridine, if appropriate in the presence of a catalytic amount of 4-dimethylaminopyridine (see Scheme 4). The reaction takes place at temperatures of from 0°C to the boiling point of the reaction mixture, preferably at room temperature, in an inert organic solvent, such as, for example, an aromatic hydrocarbon, such as benzene or toluene, or in a chlorinated hydrocarbon, such as dichloromethane, or in organic solvents such as dimethylformamide (DMF), dimethylacetamide (DMA), N-methylpyrrolidone (NMP), methyl t-butyl ether, diethyl ether or tetrahydrofuran (THF). The compounds VI can be prepared similarly to known methods, as described, for example, in Houben-Weyl, "Methoden der organischen Chemie", 4th edition, Ed. J. Talbe, pp. 587-615. Furthermore, a large number of the compounds VI is also commercially available.

The derivatized amino acid attached to the resin is then cleaved from the resin using an acid, such as trifluoroacetic acid or acetic acid, in a polar solvent, such as 2,2,2-trifluoroethanol, dichloromethane or mixtures of the solvents mentioned above, if appropriate in the presence of water. It is possible to use, for example, mixtures of 2,2,2-trifluoroethanol / acetic acid / dichloromethane.

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D) Conversion of the N-substituted phenylalanine derivative into compound I



Scheme 5

15 The conversion of the compound VIII into the phenylalanine derivatives of the formula I is carried out similarly to processes known from the literature, as described, for example, in Guan et al., J. Comb. Chem. 2 (2000), 297. Thus, the conversion of the derivatized amino acid into the amide I

20 according to the invention can be carried out by adding an amine of the formula IX (see Scheme 5) in the presence of a resin-bound condensing agent, such as, for example, polystyrene-bound dicyclohexylcarbodiimide, at temperatures of from 0°C to the boiling point of the reaction mixture, preferably at room

25 temperature, in an inert aprotic dipolar organic solvent, such as dimethylformamide (DMF), dimethylacetamide (DMA) or N-methylpyrrolidone (NMP). Amines of the formula IX can be synthesized similarly to methods known to the person skilled in the art. Moreover, a large number of the amines IX is

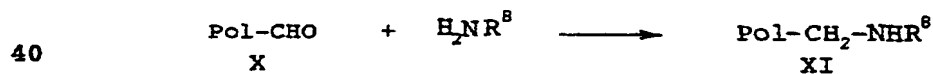
30 commercially available.

Process 2

Process 2 describes the preparation of compounds I in which R⁹ =

35 hydrogen.

A Reductive amination of a polymer resin X



Scheme 6

The reductive amination of a polymer-bound aldehyde is carried

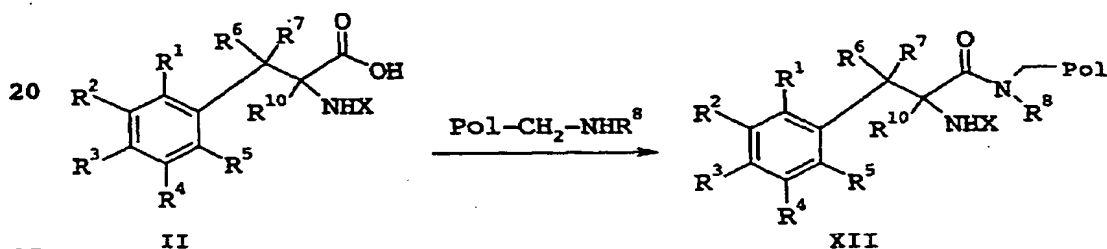
45 out similarly to known methods as described, for example, in Fivush et al., Tetrahedron Lett. 38 (1997), 7151; del Fresno et

al., *Tetrahedron Lett.* **39** (1998), 2639 and Bilodeau et al., *J Org Chem.* **63** (1998), 2800.

A suitable polymer resin, for example a
 5 4-(4-formyl-3-methoxyphenoxy)butyrylaminomethylpolystyrene resin (Pol-CHO) X is, in the presence of a reducing agent, such as sodium cyanoborohydride or else sodium trisacetoxyborohydrid, if appropriate with addition of acetic acid, methanol or ethanol, reacted in an organic solvent, such as dimethylformamide (DMF),
 10 dimethylacetamide (DMA) or N-methylpyrrolidone (NMP), with an amine IX, giving an aminated resin XI (see Scheme 6). The reaction is carried out until complete conversion is achieved, for a period of 12-24h, at temperatures of from 0°C to the boiling point of the reaction mixture, preferably at 40-60°C.

15

B N-Acylation using a substituted phenylalanine derivative



Scheme 7

The compounds XI can be reacted with a phenylalanine derivative
 II which is protected at the nitrogen function by a protective
 30 group X, for example by a 9-fluorenylmethoxycarbonyl (FMOC) protective group, a phenylmethoxycarbonyl (Cbz) group, a nitrobenzenesulfenyl (Nps) group or a 1,1-dimethylethoxycarbonyl (Boc) group, to give the compounds XII. This can be achieved, for example, by activating the carboxyl group of II with
 35 electrophilic reagents, such as, for example, benzotriazol-1-yloxytrispyrrolidinophosphonium hexafluorophosphate (PyBOP) or else with the aid of condensing agents, such as dicyclohexylcarbodiimide (DCC) or diisopropylcarbodiimide and addition of a catalytic amount of an
 40 organic base, such as, for example, N-methylmorpholine or 4-dimethylaminopyridine. The reaction is carried out until complete conversion is achieved, for a period of 12-24h, at temperatures of from 0°C to the boiling point of the reaction mixture, preferably at room temperature, in an inert organic
 45 solvent, such as, for example, an aromatic hydrocarbon, such as benzene or toluene, or in a chlorinated hydrocarbon, such as dichloromethane, or in organic solvents, such as

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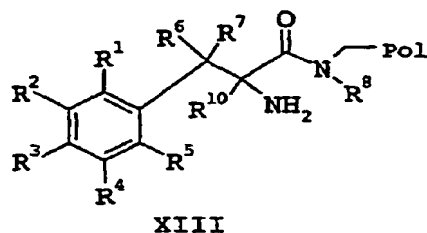
dimethylformamide (DMF), dimethylacetamide (DMA),
N-methylpyrrolidone (NMP), methyl t-butyl ether, diethyl ether or
tetrahydrofuran (THF).

5 C) Removal of the protective group X

The protective group X is removed analogously to step B of
process 1, giving compounds XIII

10

15

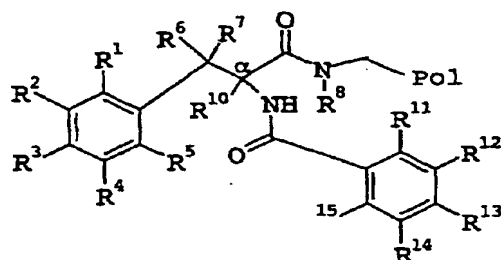


D) N-Acylation

20

The subsequent N-acylation to give the compounds I can be carried
out similarly to the procedure described in step C.1 or C.2 of
process 1, using a) a substituted benzoic acid V or [lacuna] a
benzoic acid derivative, for example a substituted benzoyl halide
25 VI, giving the compounds XIV

30



35

The derivatized amino acid which is attached to the resin is then
cleaved from the resin using an acid, such as trifluoroacetic
acid or acetic acid, in a polar solvent, such as
40 2,2,2-trifluoroethanol, dichloromethane or mixtures of the
solvents mentioned above, if appropriate in the presence of
water. It is possible, for example, to use mixtures of
2,2,2-trifluoroethanol / acetic acid / dichloromethane, giving
the compounds I in which R⁹ = hydrogen.

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It is furthermore possible to prepare compounds I in liquid phase.

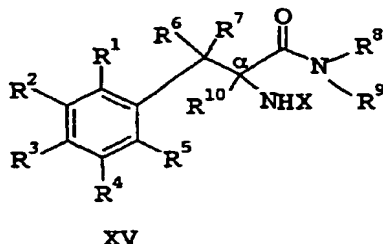
Process 3

5

A) Amination

Here, a phenylalanine derivative II protected at the nitrogen function by a protective group X, for example by a 9-fluorenylmethoxycarbonyl (Fmoc) protective group, a phenylmethoxycarbonyl (Cbz) group, a nitrobenzenesulfonyl (Nps) group or a 1,1-dimethylethoxycarbonyl (Boc) group, is initially reacted with an amine IX in the presence of a suitable condensing agent, such as, for example, dicyclohexylcarbodiimide or 15 diisopropylcarbodiimide, to give the compounds XV

20



25

If appropriate, further activation of the reaction can be achieved by using 1-hydroxybenzotriazole. The reaction is carried out until complete conversion has been achieved, over a period of 4-12h, at temperatures of from 0°C to the boiling point of the 30 reaction mixture, preferably at room temperature, in an inert organic solvent, such as, for example, an aromatic hydrocarbon, such as benzene or toluene, or in a chlorinated hydrocarbon, such as dichloromethane, or in organic solvents, such as dimethylformamide (DMF), methyl t-butyl ether, diethyl ether or 35 tetrahydrofuran (THF). The reaction is carried out similarly to known methods as described, for example, in Bouygues et al., Med. Chem. 33 (1998) 445-450.

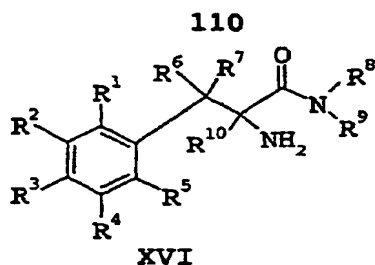
B) Removal of the protective group X

40

Depending on the protective group used, the protective group X is removed under basic, acidic or reductive conditions, for the Fmoc protective group, for example, analogously to step B of process 1, giving compounds XVI

45

5



10 C) N-Acylation

The subsequent N-acylation to give the compounds I can be carried out similarly to the procedure described in step C.1 or C.2 of process 1, using a) a substituted benzoic acid V or [lacuna] a benzoic acid derivative, for example a substituted benzoyl halide VI.

Process 4

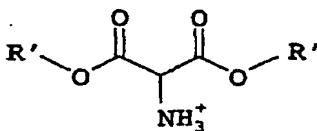
20 Substituted phenylalanine derivatives I in which R^{10} = hydrogen can also be prepared analogously to the "malonic ester synthesis" using an aminomalononic acid ester such as diethyl aminomalonate.

Step A)

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Here, the salt (for example the chloride) of an ammoniummalonic acid ester

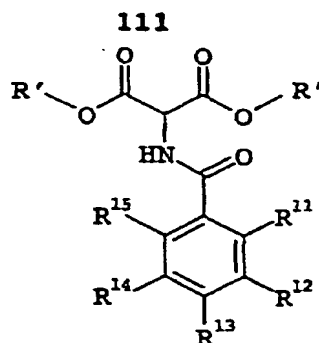
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35 in which R' is a low-molecular-weight organic radical, for example a C_1 - C_4 -alkyl radical, preferably an easily obtainable, cheap compound, such as, for example, diethyl aminomalonate or dimethyl aminomalonate is initially reacted

40 with a substituted benzoic acid, for example a substituted benzoyl halide VI, in the presence of a base, such as ethyldiisopropylamine, triethylamine or N-methylmorpholine, giving compounds XVII

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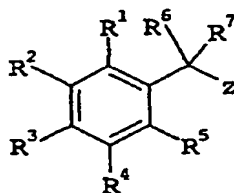


XVII

The reaction is carried out until complete conversion has been achieved, for a period of 4-12h, at temperatures of from -15°C to the boiling point of the reaction mixture, preferably at 0°C, in an inert organic solvent, such as, for example, an aromatic hydrocarbon, such as benzene or toluene, or in a chlorinated hydrocarbon, such as dichloromethane, or in organic solvents, such as dimethylformamide (DMF), methyl t-butyl ether, diethyl ether or tetrahydrofuran (THF).

Step B)

The product obtained in step A) is reacted with a benzyl derivative XVIII

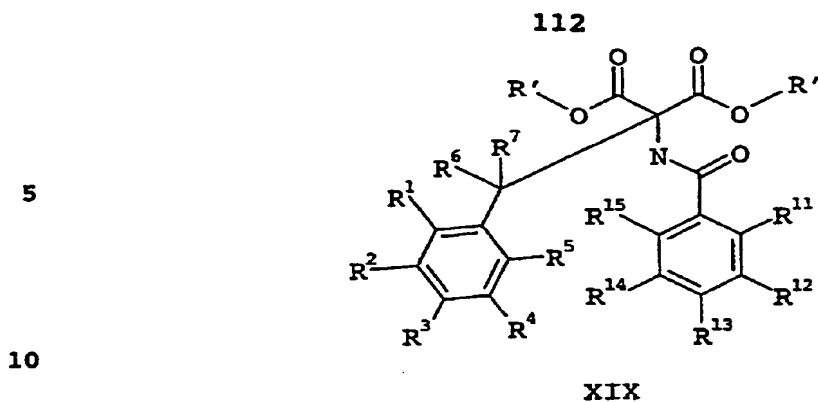


XVIII

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carrying a leaving group z, in an organic solvent, such as, for example, a cyclic ether, such as tetrahydrofuran (THF) or dioxane, in the presence of a base such as potassium tert-butoxide, sodium ethoxide, potassium carbonate or sodium carbonate, to give the diesters XIX

45



Suitable leaving groups z are, for example, halide or organosulfonyl groups. The reaction is carried out until complete conversion has been achieved, for a period of 4-12h, at temperatures of from 0°C to the boiling point of the reaction mixture, preferably at 80°C.

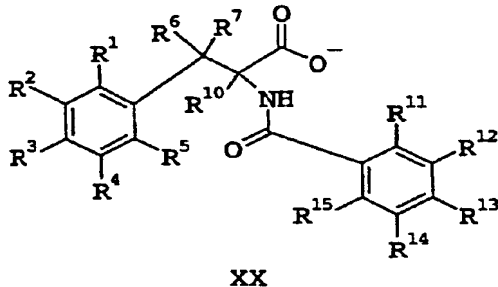
Step C)

20

Decarboxylation and hydrolysis of the diester XIX to give the compounds XX

25

30



35 are carried out in the presence of a base and water, for example aqueous sodium hydroxide solution or aqueous potassium hydroxide solution, in one of the organic solvents mentioned in step B. The mixture is subsequently neutralized to a pH below 7, preferably a pH of 1-2, using a strong mineral acid, such as, for example, hydrochloric acid.

Step D)

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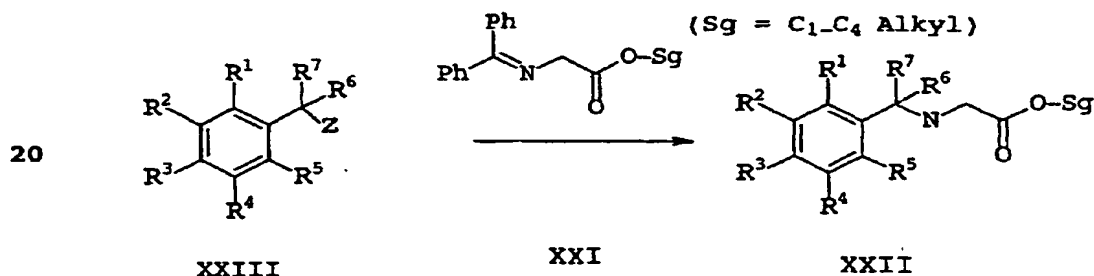
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The reaction of the acid of XX with an amine IX in the presence of resin-bound dicyclohexylcarbodiimide (DCC) is carried out analogously to the reaction conditions described in process 1, 5 step D.

Process 5

Alternatively, the compounds of the formula 1 according to the 10 invention can also be obtained by reacting the benzyl derivative XVIII with an alkylating agent XXI to give the compounds XXII. The methods for this purpose are known to the person skilled in the art (see, for example, O Donnell et al., Aldrichimica Acta Vol. 34 No. 1, 2001, pages 3 to 15) known.

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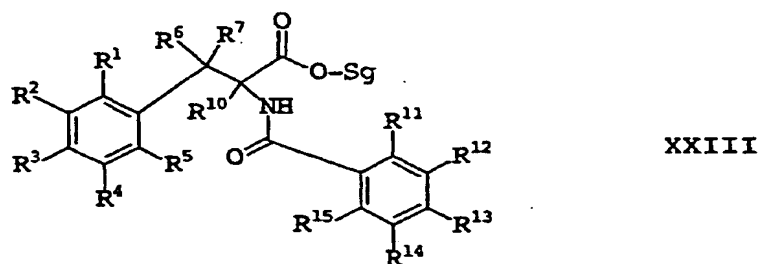


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Scheme 8

The further conversion into XXIII can be carried out analogously to the methods described in process 1, step C.1 or step C.2 by reacting the compound XXII with the benzyl derivative V or VI to 30 give compound XXIII.

35



40

Subsequent conversion of XXIII into the compounds I can be effected using amine IX. Methods for this purpose can be found, for example, in DE 3917880 or J. het. Chem. 1991, 28, 33 ff.

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- The compounds I and their agriculturally useful salts are suitable, both in the form of isomer mixtures and in the form of the pure isomers, as herbicides. The herbicidal compositions comprising compounds of the formula I control vegetation on
- 5 non-crop areas very efficiently, especially at high rates of application. They act against broad-leaved weeds and harmful grasses in crops such as wheat, rice, maize, soya and cotton without causing any significant damage to the crop plants. This effect is mainly observed at low rates of application.
- 10 Depending on the application method used, the compounds I or the herbicidal compositions comprising them, can additionally be employed in a further number of crop plants for eliminating undesirable plants. Examples of suitable crops are the following:
- 15 *Allium cepa*, *Ananas comosus*, *Arachis hypogaea*, *Asparagus officinalis*, *Beta vulgaris* spec. altissima, *Beta vulgaris* spec. rapa, *Brassica napus* var. napus, *Brassica napus* var. napobrassica, *Brassica rapa* var. silvestris, *Camellia sinensis*,
- 20 *Carthamus tinctorius*, *Carya illinoensis*, *Citrus limon*, *Citrus sinensis*, *Coffea arabica* (*Coffea canephora*, *Coffea liberica*), *Cucumis sativus*, *Cynodon dactylon*, *Daucus carota*, *Elaeis guineensis*, *Fragaria vesca*, *Glycine max*, *Gossypium hirsutum*, (*Gossypium arboreum*, *Gossypium herbaceum*, *Gossypium vitifolium*),
- 25 *Helianthus annuus*, *Hevea brasiliensis*, *Hordeum vulgare*, *Humulus lupulus*, *Ipomoea batatas*, *Juglans regia*, *Lens culinaris*, *Linum usitatissimum*, *Lycopersicon lycopersicum*, *Malus* spec., *Manihot esculenta*, *Medicago sativa*, *Musa* spec., *Nicotiana tabacum* (*N. rustica*), *Olea europaea*, *Oryza sativa*, *Phaseolus lunatus*,
- 30 *Phaseolus vulgaris*, *Picea abies*, *Pinus* spec., *Pisum sativum*, *Prunus avium*, *Prunus persica*, *Pyrus communis*, *Ribes sylvestre*, *Ricinus communis*, *Saccharum officinarum*, *Secale cereale*, *Solanum tuberosum*, *Sorghum bicolor* (s. vulgare), *Theobroma cacao*, *Trifolium pratense*, *Triticum aestivum*, *Triticum durum*, *Vicia*
- 35 *faba*, *Vitis vinifera* and *Zea mays*.

In addition, the compounds I may also be used in crops which tolerate the action of herbicides owing to breeding, including genetic engineering methods.

40

Furthermore, the compounds of the formula I are also suitable for regulating the growth of plants of plants.

45

The compounds I, or the herbicidal compositions comprising them, can be used for example in the form of ready-to-spray aqueous solutions, powders, suspensions, also highly-concentrated
5 aqueous, oily or other suspensions or dispersions, emulsions, oil dispersions, pastes, dusts, materials for broadcasting or granules, by means of spraying, atomizing, dusting, broadcasting or watering. The use forms depend on the intended aims; in any case, they should ensure a very fine distribution of the active
10 compounds according to the invention.

Essentially, suitable inert auxiliaries include:
mineral oil fractions of medium to high boiling point, such as kerosene and diesel oil, furthermore coal tar oils and oils of
15 vegetable or animal origin, aliphatic, cyclic and aromatic hydrocarbons, e.g. paraffins, tetrahydronaphthalene, alkylated naphthalenes and their derivatives, alkylated benzenes and their derivatives, alcohols such as methanol, ethanol, propanol, butanol and cyclohexanol, ketones such as cyclohexanone, or
20 strongly polar solvents, e.g. amines such as N-methylpyrrolidone, and water.

Aqueous use forms can be prepared from emulsion concentrates, suspensions, pastes, wettable powders or water-dispersible
25 granules by adding water. To prepare emulsions, pastes or oil dispersions, the phenylalanine derivatives, either as such or dissolved in an oil or solvent, can be homogenized in water by means of a wetting agent, tackifier, dispersant or emulsifier. Alternatively, it is possible to prepare concentrates consisting
30 of active substance, wetting agent, tackifier, dispersant or emulsifier and, if desired, solvent or oil, which are suitable for dilution with water.

Suitable surfactants (adjuvants) are the alkali metal salts,
35 alkaline earth metal salts and ammonium salts of aromatic sulfonic acids, e.g. ligno-, phenol-, naphthalene- and dibutyl-naphthalenesulfonic acid, and of fatty acids, alkyl- and alkylarylsulfonates, alkyl sulfates, lauryl ether sulfates and fatty alcohol sulfates, and salts of sulfated hexa-, hepta- and
40 octadecanols, and also of fatty alcohol glycol ethers, condensates of sulfonated naphthalene and its derivatives with formaldehyde, condensates of naphthalene, or of the naphthalenesulfonic acids with phenol and formaldehyde, polyoxyethylene octylphenol ether, ethoxylated isooctyl-, octyl-
45 or nonylphenol, alkylphenyl or tributylphenyl polyglycol ether, alkylaryl polyether alcohols, isotridecyl alcohol, fatty alcohol/ethylene oxide condensates, ethoxylated castor oil,

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polyoxyethylene alkyl ethers or polyoxypropylene alkyl ethers, lauryl alcohol polyglycol ether acetate, sorbitol esters, lignosulfite waste liquors or methylcellulose.

- 5 Powders, materials for broadcasting and dusts can be prepared by mixing or grinding the active substances together with a solid carrier.

- Granules, e.g. coated granules, impregnated granules and
10 homogeneous granules, can be prepared by binding the active compounds to solid carriers. Solid carriers are mineral earths, such as silicas, silica gels, silicates, talc, kaolin, limestone, lime, chalk, bole, loess, clay, dolomite, diatomaceous earth, calcium sulfate, magnesium sulfate, magnesium oxide, ground
15 synthetic materials, fertilizers such as ammonium sulfate, ammonium phosphate, ammonium nitrate and ureas, and products of vegetable origin, such as cereal meal, tree bark meal, wood meal and nutshell meal, cellulose powders, or other solid carriers.

- 20 The concentrations of the active compounds of the formula I in the ready-to-use preparations can be varied within wide ranges. In general, the formulations comprise from about 0.001 to 98% by weight, preferably from 0.01 to 95% by weight of at least one active compound. The active compounds are employed in a purity of
25 from 90% to 100%, preferably from 95% to 100% (according to the NMR spectrum).

The compounds I according to the invention can be formulated, for example, as follows:

30

- I. 20 parts by weight of the compound No. I-19 are dissolved in a mixture consisting of 80 parts by weight of alkylated benzene, 10 parts by weight of the adduct of 8 to 10 mol of ethylene oxide to 1 mol of oleic acid N-monoethanolamide, 5
35 parts by weight of calcium dodecylbenzenesulfonate and 5 parts by weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil. Pouring the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight
40 of the active compound.

- II. 20 parts by weight of the compound No. I-24 are dissolved in a mixture consisting of 40 parts by weight of cyclohexanone, 30 parts by weight of isobutanol, 20 parts
45 by weight of the adduct of 7 mol of ethylene oxide to 1 mol of isooctylphenol and 10 parts by weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil. Pouring

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the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active compound.

- 5 III. 20 parts by weight of the active compound No. I-25 are dissolved in a mixture consisting of 25 parts by weight of cyclohexanone, 65 parts by weight of a mineral oil fraction of boiling point 210 to 280°C and 10 parts by weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil.
- 10 Pouring the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active compound.
- 15 IV. 20 parts by weight of the active compound No. I-32 are mixed thoroughly with 3 parts by weight of sodium diisobutyl-naphthalenesulfonate, 17 parts by weight of the sodium salt of a lignosulfonic acid from a sulfite waste liquor and 60 parts by weight of pulverulent silica gel,
- 20 and the mixture is ground in a hammer mill. Finely distributing the mixture in 20,000 parts by weight of water gives a spray mixture which comprises 0.1% by weight of the active compound.
- 25 V. 3 parts by weight of the active compound No. I-49 are mixed with 97 parts by weight of finely divided kaolin. This gives a dust which comprises 3% by weight of the active compound.
- 30 VI. 20 parts by weight of the active compound No. I-44 are mixed intimately with 2 parts by weight of the calcium salt of dodecylbenzenesulfonate, 8 parts by weight of fatty alcohol polyglycol ether, 2 parts by weight of the sodium salt of a phenol/urea/formaldehyde condensate and 68 parts
- 35 by weight of a paraffinic mineral oil. This gives a stable oily dispersion.
- VII. 1 part by weight of the compound No. I-26 is dissolved in a mixture consisting of 70 parts by weight of cyclohexanone,
- 40 20 parts by weight of ethoxylated isooctylphenol and 10 parts by weight of ethoxylated castor oil. This gives a stable emulsion concentrate.
- VIII. 1 part by weight of the compound No. I-3 is dissolved in a mixture consisting of 80 parts by weight of cyclohexanone
- 45 and 20 parts by weight of Wettol® EM 31 (nonionic

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emulsifier based on ethoxylated castor oil). This gives a stable emulsion concentrate.

The active compounds I or the herbicidal compositions can be applied pre- or post-emergence. If the active compounds are less well tolerated by certain crop plants, application techniques may be used in which the herbicidal compositions are sprayed, with the aid of the spraying equipment, in such a way that they come into contact as little as possible, if at all, with the leaves of the sensitive crop plants, while the active compounds reach the leaves of undesirable plants growing underneath, or the bare soil surface (post-directed, lay-by).

The growth-regulating compositions can be applied by the pre-emergence method or by the post-emergence method.

Depending on the season, the control target, the target plants and the growth stage, the application rates of the growth-regulating compositions of the formula I are, when used to regulate growth, from 0.001 to 5.0, preferably from 0.01 to 1.0, kg of active substance (a.s.)/ha:

The compounds of the formula I are capable of influencing virtually all development stages of a plant in various ways and are therefore used as growth regulators. The wide range of activity of the plant growth regulators depends in particular

- a) on the plant species and variety;
 - b) on the time of application, based on the stage of development of the plant, and on the season;
 - c) on the site of application and method of application, for example (seed dressing, soil treatment, foliage application or trunk injection in the case of trees
 - d) on climatic factors, for example temperature, amount of precipitation and also length of day and intensity of light;
 - e) on the soil characteristics (including fertilizer application),
 - f) on the formulation or application form of the growth-regulating composition of the formula I and finally
 - g) on the concentrations in which the active substance is used.
- Of the number of different possible methods of application of the compound I as growth regulator in plant cultivation, in

agriculture and in horticulture, some are stated below.

- A. The compounds which can be used according to the invention permit considerable inhibition of the vegetative growth of the plants, which is evident in particular from a reduction in the growth in length. Accordingly, the treated plants exhibit stunted growth; in addition, a dark leaf coloration is observed. Reduced intensity of the growth of grasses at the edges of roads, in hedges, on canal embankments and on lawn areas such as parks, sports facilities, orchards, ornamental lawns and airfields, proves advantageous in practice, making it possible to reduce the labor-intensive and expensive cutting of grass.
- 15 The increase in the stability of crops susceptible to lodging, such as cereals, corn, sunflowers and soybean, is also of economic interest. The resulting shortening and strengthening of the stem reduce or eliminate the danger of lodging (bending) of plants under unfavorable weather conditions prior to harvesting.
- 20 The use of growth regulators for inhibiting the growth in length and for changing the time of ripening of cotton is also important. This permits completely mechanized harvesting of this important crop.
- 25 In the case of fruit trees and other trees, the growth regulators can be used to save pruning costs. In addition, the alternate bearing of fruit trees can be broken by means of growth regulators.
- 30 By using growth regulators, it is also possible to increase or inhibit the lateral branching of the plants. This is of interest when, for example in the case of tobacco plants, it is intended to inhibit the formation of side shoots in favor of leaf growth.
- 35 Growth regulators can also be used to effect a considerable increase in frost resistance, for example in the case of winter rape. On the one hand, the growth in length and the development to form a leaf or plant mass which is excessively luxuriant (and therefore particularly susceptible to frost) are inhibited. On the other hand, the young rape plants are held back in the vegetative stage of development after sowing and prior to the onset of the winter frosts, in spite of favorable growth conditions. This also eliminates the danger of frost damage to plants which tend toward a premature decline in the inhibition of blooming and toward a transition into the generative phase. In other crops too, for example winter cereals, it is advantageous

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if the crops are well tillered as a result of treatment with novel compounds in the fall but do not begin the winter with excessively luxuriant foliage. Increased sensitivity to frost and, owing to the relatively small leaf or plant mass, attack by various diseases (for example fungal disease) can thus be prevented. In addition, the inhibition of vegetative growth permits denser planting of the soil in the case of many crops, so that it is possible to achieve a higher yield, based on the soil area.

10

B. With the compounds of the formula I, it is possible to achieve higher yields of both plant parts and plant ingredients. Thus, it is possible, for example, to induce the growth of larger amounts of buds, blooms, leaves, fruits, seeds, roots and tubers, to increase the content of sugar in sugar beets, sugar cane and citrus fruits, to increase the protein content of cereals or soybean or to stimulate greater latex flow in rubber trees. The compounds of the formula I can produce increases in the yield by intervening in the metabolism of the plant or by promoting or inhibiting the vegetative and/or generative growth.

C. Finally, plant growth regulators can be used both for shortening or lengthening the stages of development and for accelerating or slowing down the ripening of the plant parts to be harvested prior to the harvest or of the harvested plant parts after harvesting.

For example, facilitating harvesting is of commercial interest and is permitted by concentrated dropping of fruit or a reduction of the strength of attachment to the tree in the case of citrus fruits, olives or other species and varieties of pomes, drupes and shell fruit. The same mechanism, ie. the promotion of the formation of abscission tissue between fruit part or leaf part and shoot part of the plant is also essential for readily controllable defoliation of useful plants, for example cotton.

D. Furthermore, the compounds of the formula I can be used to reduce the water consumption of plants. This is particularly important for agriculturally useful areas which have to be irrigated at high cost, for example in arid or semiarid regions. By using the novel substances, it is possible to reduce the intensity of irrigation and hence to carry out more economical farming. Under the influence of the compounds of the formula I, better utilization of the available water is achieved because, inter alia,

- the extent of opening of the stomata is reduced
- a thicker epidermis and cuticle are formed

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- the root penetration of the soil is improved and
- the microclimate in the crop is advantageously influenced by more compact growth.

5 The compounds of the formula I which are to be used according to the invention as growth regulators can be fed to the crops both via the seed (as seed dressing) and via the soil, i.e. through the roots and, particularly preferably, via the foliage by spraying.

10

To widen the activity spectrum and to achieve synergistic effects, the phenylalanine derivatives of the formula I may be mixed with a large number of representatives of other herbicidal or growth-regulating active compound groups and then applied
15 concomitantly. Suitable components for mixtures are, for example, 1,2,4-thiadiazoles, 1,3,4-thiadiazoles, amides, aminophosphoric acid and its derivatives, aminotriazoles, anilides, (het)aryloxy-alkanoic acids and their derivatives, benzoic acid and its derivatives, benzothiadiazinones, 2-(aroyl/hetaroyl)-1,3-cyclo-
20 hexanediones, hetaryl aryl ketones, benzylisoxazolidinones, meta-CF₃-phenyl derivatives, carbamates, quinolinecarboxylic acid and its derivatives, chloroacetanilides, cyclohexenone oxime ether derivatives, diazines, dichloropropionic acid and its derivatives, dihydrobenzofurans, dihydrofuran-3-ones, dinitro-
25 anilines, dinitrophenols, diphenyl ethers, dipyridyls, halocarboxylic acids and their derivatives, ureas, 3-phenyl-uracils, imidazoles, imidazolinones, N-phenyl-3,4,5,6-tetrahydrophthalimides, oxadiazoles, oxiranes, phenols, aryloxy- and heteroaryloxyphenoxypropionic esters, phenylacetic acid and its
30 derivatives, phenylpropionic acid and its derivatives, pyrazoles, phenylpyrazoles, pyridazines, pyridinecarboxylic acid and its derivatives, pyrimidyl ethers, sulfonamides, sulfonylureas, triazines, triazinones, triazolinones, triazolecarboxamides and uracils.

35

It may furthermore be advantageous to apply the compounds of the formula I, alone or else concomitantly in combination with other herbicides, or in the form of a mixture with other crop protection agents, for example together with agents for
40 controlling pests or phytopathogenic fungi or bacteria. Also of interest is the miscibility with mineral salt solutions, which are employed for treating nutritional and trace element deficiencies. Non-phytotoxic oils and oil concentrates may also be added.

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The application rates of the active compound are from 0.001 to 3.0, preferably from 0.01 to 1.0 kg/ha of active substance (a.s.), depending on the control target, the season, the target plants and the growth stage.

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Preparation Examples

Preparation of the compound I-44

10 A) Reductive amination of a polymer resin

20 g of 4-(4-formyl-3-methoxyphenoxy)butyryl-aminomethylpolystyrene resin were initially charged in 200 ml of dimethylformamide and 2 ml of acetic acid, 49 ml of methylamine, 15 10.7 ml of trimethyl orthoformate and 6.2 g of sodium cyanoborhydride were added and the mixture was shaken at 50°C for 18 hours. After cooling to room temperature, the resin was filtered off, washed with in each case 100 ml of dimethylformamide (2x), methanol (1x), tetrahydrofuran (3x) and 20 dichloromethane (3x) and dried at room temperature.

B) N-Acylation using a substituted phenylalanine derivative

5 g of the resin prepared in step A were initially charged in 25 50 ml of dichloromethane/dimethylformamide 1:1, 4.4 g of Fmoc-2-fluorophenylalanine and 5.6 g of benzotriazol-1-yloxy-trispyrrolidinophosphonium hexafluorophosphate (PyBOP) were added and the mixture was shaken at room temperature for 5 min. 1.9 ml of N-methylmorpholine were 30 then added, and the mixture was shaken at room temperature for 18 hours. The resin was filtered off and then washed with in each case 20 ml of dimethylformamide (5x).

C) Removal of the protective group X

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To remove the Fmoc protective group, the resin was suspended in 50 ml of dimethylformamide/piperidine 1:1 and shaken at room temperature for 1 h. The resin was then filtered off and washed with in each case 20 ml of dimethylformamide (2x), methanol (1x), 40 tetrahydrofuran (3x) and dichloromethane (3x). The resin was dried at room temperature.

D) N-Acylation

45 250 mg of the resin from step C, 133 mg of 2,4-dichloro-3-(difluoromethyl)benzoic acid and 286 mg of benzotriazol-1-yloxytrispyrrolidinophosphonium

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hexafluorophosphate (PyBOP) were initially charged in dichloromethane/dimethylformamide 1:1 (2.5 ml). After 5 minutes of shaking, 97 µl of N-methylmorpholine were added, and the mixture was shaken at room temperature for 18 h. The resin was then filtered off and washed with in each case 3 ml of dimethylformamide (2x), methanol (1x), tetrahydrofuran (3x) and dichloromethane (3x). To cleave the product from the solid support, about 2 ml of trifluoroacetic acid/dichloromethane 1:3 were added to the resin. The mixture was shaken for 30 min and then filtered, and the filtrate was concentrated for further use.

*) 2,4-Dichloro-3-(difluoromethyl)benzoic acid was prepared as follows: Reaction of 1,3-dichloro-2-methylbenzene with acetyl chloride and subsequent oxidation to give 1,3-dichloro-2-methylbenzoic acid, conversion of the benzoic acid into the methyl ester, followed by bromination of the methyl group located in position 2, oxidation of the brominated methyl group to give the corresponding aldehyde, fluorination of the resulting product with diethylaminosulfur trifluoride and subsequent hydrolysis of the resulting methyl 2,4-dichloro-2-difluoromethylbenzoate to give 2,4-dichloro-3-(difluoromethyl)benzoic acid.

Yield: 48%

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Preparation of the compound I-32 by process 4

Step A

13.8 ml of triethylamine were added to 5.29 g of diethyl aminomalonate hydrochloride in 100 ml of dichloromethane. With ice-cooling, trifluoromethylbenzoyl chloride was added to the resulting suspension, which was then shaken at room temperature overnight. The mixture was then extracted with 50 ml of water and the organic phase was separated off and dried over magnesium sulfate.

Step B

0.8 g of 1-(2-fluorophenyl)ethyl methanesulfonate *) and 0.673 g of potassium tert-butoxide were added to 1.27 g of the ester formed in step A in 20 ml of dioxane, and the mixture was incubated at 80°C with shaking overnight. Water was then added at room temperature, followed by extraction with dichloromethane and subsequent drying over magnesium sulfate.

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*) 1-(2-fluorophenyl)ethyl methanesulfonate was prepared from 1-(2-fluorophenyl)ethanol by reaction with methanesulfonic anhydride.

5 Step C

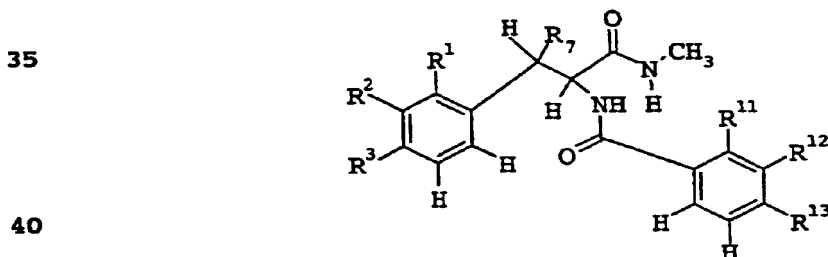
1 ml of concentrated (about 45% by weight strength) aqueous sodium hydroxide solution was added to 0.8 g of the diester formed in step B in 10 ml of dioxane, and the mixture was incubated at 80°C with stirring overnight. Water was then added at room temperature. Following addition of hydrochloric acid until a pH of 2 had been reached, the mixture was extracted with ethyl acetate and the organic phase was separated off and concentrated.

15 Step D

3.58 g of polymer-bound DCC and 0.315 g of methylamine (40% by volume in water) were added to 0.75 g of the acid formed in step C, the mixture was shaken at room temperature overnight and the resin was filtered off.

The compounds listed in Table I below were prepared by appropriate modification of the process described above. The compounds II required for the synthesis of the compounds were obtained from Fluka and Advanced Chem Tech, the substituted benzoic acids V and the substituted benzoyl chlorides VI were obtained from Aldrich and ABCR and the amines IX were obtained from Aldrich.

30 The resulting phenylalanine derivatives of the formula I where R⁴, R⁵, R⁶, R⁸, R¹⁴ and R¹⁵ = hydrogen and R⁹ = methyl, as shown below,



are listed in Table I together with physical data and the mass signal (M⁺). The measurements were carried out by LC-MS 45 (HP-1100, Agilent) using the following conditions:

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LC-MS conditions:

Buffer A (isopropanol, 0.05% trifluoroacetic acid)

Buffer B (water, 0.05% trifluoroacetic acid)

Flow rate: 1.2 ml/min

5 Injection volume: 2 μ l

Fragmentation voltage: 20V, positive ionization

mass range (m/z): 130-700

Column: Merck ROD column (50 x 4.6 mm)

10 N₂ detection:

(Method UV-MS-N₂)

Injection volume: 5 μ l

Fragmentation voltage: 20V, positive ionization

mass range (m/z): 130-700

15

Preparation of compound II-15 by process 5

Preparation of the intermediate 1-(2-fluorophenyl)-1-bromopropane

20 Step 1

At -20°C, 100 ml of a 1 M solution of ethylmagnesium bromide in THF were added to 10.0 g (0.081 mol) of 2-F-benzaldehyde in 150 ml of THF, the mixture was incubated with stirring for 1.5 h

25 and 100 ml of saturated NH₄Cl solution was added dropwise. The mixture was saturated with NaCl and the organic phase was then separated off, the aqueous phase was extracted with ethyl acetate and the combined organic phases were concentrated.

30 ¹H-NMR signals (CDCl₃): 7.6-7.0 (m, 4 H), 5.0 (t, 1 H), 2.0 br.s. 1 H), 1.8 (m, 2 H), 1.0 (t, 3 H)

Yield: 11.2 g as a crude product of a purity of about 70% which was used without further purification for step 2

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Step 2

11.2 g of the 1-(2-fluorophenyl)-1-bromopropane obtained in step 1 were dissolved in 150 ml of CH₂Cl₂, 90 ml of a 1 M solution of 40 BBr₃ in CH₂Cl₂ were added at 0°C and the mixture was, after 1 h at 0°C, poured into ice-water. The organic phase was removed and the aqueous phase was then extracted with CH₂Cl₂, and the combined organic phases were concentrated.

45 ¹H-NMR signals (CDCl₃): 7.4-7.0 (m, 4 H), 5.3 (m, 1 H), 2.3 (m, 1 H), 2.1 (m, 1 H), 1.0 (t, 3 H)

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Yield: 14.2 g of the title compound, which was reacted further as a crude product of a purity of about 85%

Preparation of Na-(2-trifluoromethyl-4-fluorobenzoyl)-
5 2-(1-methyl-1-(2-fluorophenyl))glycine-N-methylamide (compound II-15)

Step 1

- 10 8.61 g of ethyl diphenylmethylideneglycinate, 7.0 g of 1-(1-bromopropyl)-2-fluorobenzene, 13.6 g (0.1 mol) of K₂CO₃ and 1.06 g (0.003 mol) of tetrabutylammonium bromide in 200 ml of acetonitrile were stirred under reflux for 43 h, cooled and filtered off. After concentration, the filtrate was dissolved in
15 150 ml of THF and stirred with 150 ml of 10% strength citric acid until the conversion was complete. After removal of the THF, the mixture was extracted with MTBE (methyl tert-butyl ether), the aqueous phase was saturated with K₂CO₃ and the product was extracted 3 times with in each case 100 ml of ethyl acetate.
20 Drying and concentration gave 4.92.4 g of crude product which was used without further purification for the next step.

Step 2

- 25 2.4 g of the ethyl 2-(1-methyl-1-(2-(2-fluorophenyl))glycinate from step 1 were dissolved in 100 ml of methylene chloride, 3.48 g of NEt₃ were added and, at 0°C, 1.27 g (0.01 mol) of 2-trifluoromethyl-4-F-benzoyl chloride were added dropwise. The mixture was stirred at room temperature for 16 h and then diluted
30 with 200 ml of ethyl acetate and washed with in each case 100 ml of 1N HCl and water, and the organic phase was removed under reduced pressure. Chromatographic separation on silica gel (mobile phase cyclohexane/ethyl acetate 8/1) gave 0.7 g of the pure diastereomer A of ethyl Na-(2-trifluoromethyl-
35 4-fluorobenzoyl)-2-(1-methyl-1-(2-fluorophenyl))glycinate, 0.22 g of a 1:1 mixture of the two diastereomers A and B of ethyl Na-(2-trifluoromethyl-4-fluorobenzoyl)-2-(1-methyl-1-(2-fluorophenyl))glycinate and 0.6 g of the diastereomer B of ethyl Na-(2-trifluoromethyl-4-fluorobenzoyl)-2-(1-methyl-1-(2-fluoro-
40 phenyl))glycinate. Diastereomers A and B were separately characterized by spectroscopy, and all three fractions were then combined for the further conversion in step 3 to 1.55 g of a 1:1 diastereomer mixture.
- 45 Signals in the ¹H-NMR (CDCl₃) of diastereomer A ethyl (Na-(2-trifluoromethyl-4-fluorobenzoyl)-2-(1-methyl-1-(2-fluorophenyl))glycinate): 7.5-7.0 (m, 7 H), 6.1 (br. d 1H), 5.1 (m, 1

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H), 4.3 (m, 2 H), 3.5 (m, 1 H), 2.1-2.0 (m, 2 H), 1.3 (t, 3 H), 1.0 (t, 3 H).

Signals in the $^1\text{H-NMR}$ (CDCl_3): of diastereomer B ethyl

5 (N α -(2-trifluoromethyl-4-fluorobenzoyl)-2-(1-methyl-1-(2-fluorophenyl))glycinate): 7.6 -7.0 (m, 7 H), 6.3 (br. d, 1 H), 5.1 (m, 1 H), 4.1 (m, 2 H), 3.3 (m, 1 H), 2.0 (mc 2 H), 1.1 (t, 3 H), 0.8 (t, 3 H).

10 Step 3

1.5 g of the diastereomer mixture formed in step 2 were dissolved in 100 ml of ethanol. Subsequently, gaseous methylamine was added to the solution until saturation had been reached. After 4 days
15 of stirring at room temperature, the mixture was concentrated and 200 ml of MTBE were added. The resulting solid was filtered off and dried. The resulting product was a 1:1 mixture of the diastereomers of compound II-15.

20 Yield: 0.261 g

Melting point: 201-202°C

$^1\text{H-NMR}$ signals ($\text{d}_6\text{-DMSO}$): 9.0 (br. d, 1 H), 8.7 (d, 1 H), 8.2
25 (d, 1 H), 7.8-7.1 (m, 14 H), 6.8 (m, 1 H), 4.9 (m, 1 H), 4.8 (m, 1 H), 3.3 (m, 2 H), 1.9 (m, 1 H), 1.6 (m, 3 H) 2.6 (d, 3 H), 2.4 (d, 3 H), 0.8 (m, 6 H).

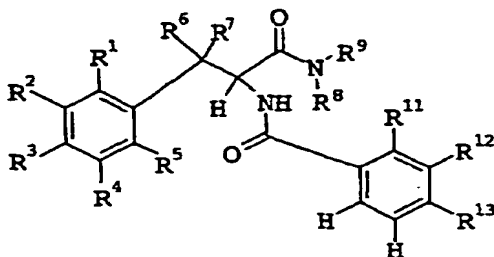
The compounds listed in table II below were prepared by modifying
30 the process described above in an appropriate manner. The starting materials required for synthesizing the compounds were obtained from Fluka and Advanced Chem Tech, the substituted benzoic acids V and the substituted benzoyl chlorides VI from Aldrich and ABCR and the amines IX from from Aldrich.

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The resulting phenylalanine derivatives of the formula I where R^9 , R^{10} , R^{14} and R^{15} = hydrogen as shown below

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are [lacuna] in table II together with the melting point or physical data (mass signal (M+) and LC-MS measurements using conditions a or i).

5 LC-MS conditions a:

Buffer A (acetonitrile, 0.1% trifluoroacetic acid)

Buffer B (water, 0.1% trifluoroacetic acid)

Flow rate: 1.8 ml/min

Temperature: 80°C

10 Injection volume: 2 µl

Fragmentation voltage: 80V, positive ionization,
mass range (m/z): 100-700

Column: Merck ROD column (50 x 4.6 mm)

15 LC-MS conditions i:

Buffer A (isopropanol, 0.05% trifluoroacetic acid)

Buffer B (water 0.05% trifluoroacetic acid)

Flow rate: 1.5 ml/min

Injection volume: 2 µl

20 Temperature: 40°C

Fragmentation voltage: 20V, positive ionization
mass range (m/z): 130-700

Column: Merck ROD column (50 x 4.6 mm)

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Table I

	No.	R ¹	R ²	R ³	R ⁷	R ¹¹	R ¹²	R ¹³	R ¹⁴	Configuration	M+
5	I-1	F	H	H	H	F	H	H	H	Racemate	319
	I-2	F	H	H	H	Cl	Cl	H	H	Racemate	369
	I-3	F	H	H	H	CF ₃	H	H	H	Racemate	369
	I-4	H	F	H	H	F	H	H	H	Racemate	319
10	I-5	H	F	H	H	Cl	Cl	H	H	Racemate	370
	I-6	H	F	H	H	Br	H	H	H	Racemate	380
	I-7	H	F	H	H	CF ₃	H	H	H	Racemate	369
	I-8	H	Cl	H	H	F	H	H	H	Racemate	335
15	I-9	H	Cl	H	H	Cl	Cl	H	H	Racemate	386
	I-10	H	Cl	H	H	Br	H	H	H	Racemate	396
	I-11	H	Cl	H	H	CF ₃	H	H	H	Racemate	384
	I-12	Cl	H	H	H	F	H	H	H	Racemate	335
20	I-13	Cl	H	H	H	Cl	Cl	H	H	Racemate	386
	I-14	Cl	H	H	H	Br	H	H	H	Racemate	396
	I-15	Cl	H	H	H	CF ₃	H	H	H	Racemate	385
	I-16	CH ₃	H	H	H	F	H	H	H	Racemate	315
25	I-17	CH ₃	H	H	H	Cl	Cl	H	H	Racemate	366
	I-18	CH ₃	H	H	H	Br	H	H	H	Racemate	376
	I-19	CH ₃	H	H	H	CF ₃	H	H	H	S	365
	I-20	H	CH ₃	H	H	F	H	H	H	Racemate	315
30	I-21	H	CH ₃	H	H	Cl	Cl	H	H	Racemate	366
	I-22	H	CH ₃	H	H	Br	H	H	H	Racemate	376
	I-23	H	CH ₃	H	H	CF ₃	H	H	H	Racemate	365
	I-24	H	F	H	H	CF ₃	F	H	H	S	387
35	I-25	H	F	H	H	CF ₃	H	H	F	S	387
	I-26	H	H	H	H	CF ₃	H	H	H	S	351
	I-27	H	H	H	H	Cl	Cl	H	H	Racemate	352
	I-28	CH ₃	H	H	H	CF ₃	H	H	H	Racemate	365
40	I-29	CH ₃	H	H	H	Cl	Cl	H	H	Racemate	366
	I-30	F	H	H	H	CF ₃	H	H	H	R	369
	I-31	F	H	H	H	Cl	Cl	H	H	R	370
	I-32	F	H	H	CH ₃	CF ₃	H	H	H	Diastereomer	383
45	I-33	CH ₃	H	H	H	Cl	CF ₃	H	H	Racemate	399
	I-34	CH ₃	H	H	H	CF ₃	H	F	H	Racemate	383
	I-35	CH ₃	H	H	H	CF ₃	F	H	H	Racemate	383
	I-36	H	H	F	H	CF ₃	H	H	H	Racemate	369
	I-37	H	H	Cl	H	CF ₃	H	H	H	Racemate	385

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No.	R ¹	R ²	R ³	R ⁷	R ¹¹	R ¹²	R ¹³	R ¹⁴	Configuration	M+
I-38	H	H	F	H	Cl	Cl	H	H	Racemate	370
I-39	H	H	Cl	H	Cl	Cl	H	H	Racemate	386
5 I-40	F	H	H	H	Cl	CF ₃	H	H	S	403
I-41	F	H	H	H	Cl	H	NO ₂	H	S	380
I-42	F	H	H	H	Cl	H	SO ₂ CH ₃	H	S	413
I-43	F	H	H	H	Cl	CN	OCH ₃	H	S	390
10 I-44	F	H	H	H	Cl	CHF ₂	Cl	H	S	420
I-45	F	H	H	H	Cl	CH ₃	NO ₂	H	S	394
I-46	CH ₃	H	H	H	Cl	H	NO ₂	H	S	376
I-47	CH ₃	H	H	H	Cl	H	SO ₂ CH ₃	H	S	409
I-48	CH ₃	H	H	H	Cl	CN	OCH ₃	H	S	386
15 I-49	CH ₃	H	H	H	Cl	CHF ₂	Cl	H	S	416
I-50	CH ₃	H	H	H	Cl	CH ₃	NO ₂	H	S	390
I-51	CH ₃	H	H	H	CF ₃	H	F	H	S	383
I-52	CH ₃	H	H	H	Cl	CF ₃	H	H	S	399
20 I-53	CH ₃	H	H	H	CF ₃	F	H	H	S	383
I-54	F	H	H	H	CF ₃	H	H	H	S	369
I-55	F	H	H	H	Cl	Cl	H	H	S	370
I-56	F	H	H	H	Cl	H	Cl	H	S	370
25 I-57	F	H	H	H	Cl	H	F	H	S	353
I-58	CF ₃	H	H	H	CF ₃	H	H	H	S	419
I-59	CF ₃	H	H	H	Cl	Cl	H	H	S	419
I-60	CH ₃	H	H	H	Cl	H	Cl	H	S	365
30 I-61	CH ₃	H	H	H	Cl	H	F	H	S	349

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PF 53234

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Table II

No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ⁶	R ⁷	R ⁸	R ⁹	R ¹¹	R ¹²	R ¹³	M+H+	LC-MS cond.	m.p. [°C]
II-1	F	OCH ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	F			208-209
II-2	H	H	H	CF ₃	H	H	H	CH ₃	H	CF ₃	H	F			219-220
II-3	F	H	H	H	H	CH ₃	H	CH ₃	H	CF ₃	H	H			192-193
II-4	F	H	H	H	H	H	CH ₃	CH ₃	H	CF ₃	H	H			231-132
II-5	CH ₂ CH ₃	H	H	H	H	H	H	CH ₃	H	CF ₃	H	F			198-199
II-6	F	H	H	H	H	CH ₃	H	CH ₃	H	CF ₃	H	F			203-204
II-7	F	H	H	H	H	H	CH ₃	CH ₃	H	CF ₃	H	F			213-215
II-8	CH ₃	H	H	H	H	CH ₃	H	CH ₃	H	CF ₃	H	H			214-215
II-9	CH ₃	H	H	H	H	H	CH ₃	CH ₃	H	CF ₃	H	H			260
II-10	CH ₃	H	H	H	H	CH ₃	H	CH ₃	H	CF ₃	H	F			200-201
II-11	F	H	H	H	H	(CH ₂) ₃ CH ₃	H	CH ₃	H	CF ₃	H	H			204
II-12	F	H	H	H	H	(CH ₂) ₂ CH ₃	H	CH ₃	H	CF ₃	H	F			206-210
II-13	CH ₃	H	H	H	H	(CH ₂) ₂ CH ₃	H	CH ₃	H	CF ₃	H	F			235-237
II-14	CH ₃	H	H	H	H	CH ₂ CH ₃	H	CH ₃	H	CF ₃	H	F			220-222
II-15	F	H	H	H	H	CH ₂ CH ₃	H	CH ₃	H	CF ₃	H	F			201-202
II-16	F	H	H	H	H	CH ₂ CH ₃	H	CH ₃	H	CF ₃	H	H			195-196
II-17	CH ₃	H	H	H	H	CH ₂ CH ₃	H	CH ₃	H	CF ₃	H	H			228-230
II-18	CH ₃	H	H	H	CH ₃	H	H	CH ₃	H	CF ₃	H	H			224

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No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ⁶	R ⁷	R ⁸	R ⁹	R ¹¹	R ¹²	R ¹³	M+H ⁺	LC-MS cond.	m.p. [°C]
II-19	Br	H	H	H	H	H	H	CH ₃	H	CF ₃	H	H	430.2	a	
II-20	Cl	Cl	H	H	Cl	H	H	CH ₃	H	CF ₃	H	H	454.1	a	
II-21	F	H	H	H	H	(CH ₂) ₃ CH ₃	H	CH ₃	H	CF ₃	H	F			198-200
II-22	F	H	H	H	H	(CH ₂) ₃ CH ₃	H	CH ₃	H	CF ₃	H	F			215-218
II-23	F	H	H	H	Cl	H	H	CH ₃	H	CF ₃	H	H			205-207
II-24	F	H	H	H	Cl	H	H	CH ₃	H	CF ₃	H	F			215-216
II-25	H	H	H	H	H	CH ₂ CH ₃	H	CH ₃	H	CF ₃	H	H			205-206
II-26	OH	H	H	H	H	H	H	CH ₃	H	CF ₃	H	F			215-216
II-27	CF ₃	H	F	H	H	H	H	CH ₃	H	CF ₃	H	F			210-211
II-28	Cl	Cl	OCH ₃	H	H	H	H	CH ₃	H	CF ₃	H	F			253-254
II-29	Cl	Cl	OCH ₃	H	H	H	H	CH ₃	H	CF ₃	H	H			236-237
II-30	F	H	Cl	H	H	H	H	CH ₃	H	CF ₃	H	F			209-210
II-31	F	H	Cl	H	H	H	H	CH ₃	H	CF ₃	H	H			220-221
II-32	OCH ₃	H	OCH ₃	H	H	H	H	CH ₃	H	CF ₃	H	H			229-230
II-33	OCH ₃	H	H	OCH ₃	H	H	H	CH ₃	H	CF ₃	H	F			226-227
II-34	Et	H	H	H	H	H	H	CH ₃	H	CF ₃	H	F			188-190
II-35	OCH ₃	H	H	H	H	H	H	CH ₃	H	CF ₃	H	H			216-217
II-36	OCH ₃	H	H	H	H	H	H	CH ₃	H	CF ₃	H	F			196-197
II-37	NO ₂	H	H	H	Cl	H	H	CH ₃	H	CF ₃	H	F			203-204
II-38	NO ₂	H	H	H	Cl	H	H	CH ₃	H	CF ₃	H	H			212-214
II-39	H	CF ₃	H	CF ₃	H	H	H	CH ₃	H	CF ₃	H	H	487.1	a	

No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ⁶	R ⁷	R ⁸	R ⁹	R ¹¹	R ¹²	R ¹³	M ⁺ H ⁺	LC-MS cond.	m.p. [°C]
II-40	H	CH ₃	H	CH ₃	H	H	H	CH ₃	H	CF ₃	H	H	379.1	a	
II-41	F	F	H	H	H	H	H	CH ₃	H	CF ₃	H	H	387.1	a	
II-42	H	H	H	H	H	H	H	CH ₂ C(CH ₃) ₂	H	CF ₃	H	F	393.1	a	
II-43	H	H	H	H	H	H	H	CH ₂ CH(CH ₃) ₂	H	CF ₃	H	F	395.0	a	
II-44	H	H	H	H	H	H	H	CH ₂ CH(CH ₃) ₂	H	CF ₃	H	H	375.1	a	
II-45	H	H	H	H	H	H	H	CH ₂ CH(CH ₃) ₂	H	CF ₃	H	H	377.1	a	
II-46	F	H	H	F	Cl	H	H	CH ₃	H	CF ₃	H	H	421.0	a	
II-47	H	CF ₃	H	F	H	H	H	CH ₃	H	CF ₃	H	H	437.1	a	
II-48	SCF ₃	H	H	H	H	H	H	CH ₃	H	CF ₃	H	H	451.1	a	
II-49	H	Br	H	H	H	H	H	CH ₃	H	CF ₃	H	H	429.0	a	
II-50	H	F	H	F	H	H	H	CH ₃	H	CF ₃	H	H	387.1	a	
II-51	F	H	H	Cl	H	H	H	CH ₃	H	CF ₃	H	H	403.1	a	
II-52	F	H	H	CF ₃	H	H	H	CH ₃	H	CF ₃	H	H	437.1	a	
II-53	Br	H	H	F	H	H	H	CH ₃	H	CF ₃	H	H	449.0	a	
II-54	H	OCHF ₂	H	H	H	H	H	CH ₃	H	CF ₃	H	H	417.1	a	
II-55	F	Cl	H	CF ₃	H	H	H	CH ₃	H	CF ₃	H	H	471.0	a	
II-56	F	CH ₃	H	H	F	H	H	CH ₃	H	CF ₃	H	H	401.1	a	
II-57	F	F	H	F	H	H	H	CH ₃	H	CF ₃	H	H	405.1	a	
II-58	Cl	H	H	CF ₃	H	H	H	CH ₃	H	CF ₃	H	H	453.0	a	
II-59	H	SCF ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	H	451.0	a	
II-60	F	H	H	F	H	H	H	CH ₃	H	CF ₃	H	H	387.1	a	
II-61	NO ₂	H	H	CH ₃	H	H	H	CH ₃	H	CF ₃	H	H	410.1	a	

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No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ⁶	R ⁷	R ⁸	R ⁹	R ¹¹	R ¹²	R ¹³	M+H ⁺	LC-MS cond.	m.p. [°C]
II-62	F	Cl	H	H	H	H	H	CH ₃	H	CF ₃	H	H	403.1	a	
II-63	Cl	H	H	H	Cl	H	H	CH ₃	H	CF ₃	H	H	419.0	a	
II-64	H	OCH ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	H	381.1	a	
II-65	H	OCF ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	H	435.1	a	
II-66	Cl	CF ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	H	453.1	a	
II-67	NO ₂	Cl	H	H	H	H	H	CH ₃	H	CF ₃	H	H	430.0	a	
II-68	NO ₂	H	H	H	H	H	H	CH ₃	H	CF ₃	H	H	396.1	a	
II-69	H	OCH ₃	H	OCH ₃	H	H	H	CH ₃	H	CF ₃	H	H	411.1	a	
II-70	Cl	CH(CH ₃) ₂	H	H	H	H	H	CH ₃	H	CF ₃	H	H	427.1	a	
II-71	CH ₃	H	H	NO ₂	H	H	H	CH ₃	H	CF ₃	H	H	410.1	a	
II-72	F	H	H	H	F	H	H	CH ₃	H	CF ₃	H	H			200-201
II-73	Cl	OCH ₃	H	OCH ₃	Cl	H	H	CH ₃	H	CF ₃	H	H			229-230
II-74	Cl	OCH ₃	H	OCH ₃	H	H	H	CH ₃	H	CF ₃	H	H			220-221
II-75	CN	H	H	H	H	H	H	CH ₃	H	CF ₃	H	H			232-233
II-76	OCHE ₂	H	H	H	H	H	H	CH ₃	H	CF ₃	H	H			187-188
II-77	CH ₃	CF ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	F	451.4	i	
II-78	F	CH ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	F	401.4	i	
II-79	CH ₃	H	H	CH ₃	H	H	H	CH ₃	H	CF ₃	H	F	397.4	i	
II-80	H	CH ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	F	383.4	i	
II-81	F	CF ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	F	455.4	i	
II-82	CH(CH ₃) ₂	H	H	H	H	H	H	CH ₃	H	CF ₃	H	F	411.4	i	
II-83	CF ₃	H	H	H	H	H	H	CH ₃	H	CF ₃	H	F	455.4	i	

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No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ⁶	R ⁷	R ⁸	R ⁹	R ¹¹	R ¹²	R ¹³	M+H ⁺	LC-MS cond.	m.p. [°C]
II-84	CH ₃	CH ₃	H	CH ₃	CH ₃	H	H	CH ₃	H	CF ₃	H	F	425.4	i	
II-85	CH ₃	H	H	H	CH ₃	H	H	CH ₃	H	CF ₃	H	F	397.4	i	
II-86	CH ₃	H	H	F	H	H	H	CH ₃	H	CF ₃	H	F	401.4	i	
II-87	CH ₃	Cl	H	H	H	H	H	CH ₃	H	CF ₃	H	H			223-224
II-88	CH ₃	H	H	CH ₃	H	H	H	CH ₃	H	CF ₃	H	H	379.4	i	
II-89	F	CH ₃	H	H	H	H	H	CH ₃	H	CF ₃	H	H	437.4	i	
II-90	H	H	H	H	H	H	H	CH ₃	H	CF ₃	H	H	365.1	a	
II-91	H	H	H	H	H	H	H	CH ₃	H	CF ₃	H	F	369.1	a	
II-92	H	H	H	F	H	H	H	OH	H	CF ₃	H	H	320.1	a	
II-93	H	H	H	F	H	H	H	OCH ₃	H	CF ₃	H	H	320.1	a	
II-94	H	H	H	H	H	H	H	OH	CH ₃	CF ₃	H	F	338.1	a	
II-95	H	H	H	F	H	H	H	OCH ₃	H	CF ₃	H	F	338.1	a	
II-96	F	H	H	F	H	H	H	OH	H	CF ₃	H	F	352.0	a	
II-97	H	H	H	F	H	H	H	OCH ₃	H	CF ₃	H	H	320.0	a	
II-98	H	H	H	F	H	H	H	OH	H	CF ₃	H	F	338.0	a	
II-99	F	H	H	F	H	H	H	OH	H	CF ₃	H	F	358.1	a	
II-100	F	H	H	F	H	H	H	CH ₃	H	CF ₃	H	F	389.0	a	
II-101	H	F	H	H	H	H	H	CH ₃	H	F	H	H	305.1	a	
II-102	H	H	H	H	H	H	H	CH ₃	H	F	CF ₃	H	369.1	a	
II-103	H	H	H	H	H	H	H	CH ₃	H	F	F	H	319.1	a	
II-104	CH ₃	H	H	H	H	H	H	CH ₃	H	Cl	Cl	H	352.1	a	
II-105	F	H	H	H	H	H	H	CH ₃	H	Cl	Cl	H	356.1	a	

No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ⁶	R ⁷	R ⁸	R ⁹	R ¹¹	R ¹²	R ¹³	M+H ⁺	LC-MS cond.	m.p. [°C]
II-106	H	H	H	H	H	H	H	CH ₃	H	Cl	Cl	H	352.1	a	
II-107	CH ₃	H	H	F	H	H	H	CH ₃	H	Cl	CF ₃	H	398.81	a	
II-108	F	H	H	H	H	H	H	CH ₃	H	Cl	H	Cl	370.0	a	
II-109	F	H	H	F	H	H	H	CH ₃	H	Cl	Cl	F	353.0	a	
II-110	H	H	H	H	H	H	H	CH ₃	H	Cl	H	Cl	352.1	a	
II-111	CH ₃	H	H	H	H	H	H	CH ₃	H	SO ₂ CH ₃	H	H	375.1	a	
II-112	CH ₃	H	H	H	H	H	H	CH ₃	H	SO ₂ CHF ₂	H	H	379.0	a	
II-113	CH ₃	H	H	H	H	CH ₃	H	CH ₃	H	Cl	CF ₃	H	413.84	a	

Use Examples for herbicidal action

The herbicidal activity of the phenylalanine derivatives of the
5 formula I was demonstrated by greenhouse experiments:

The cultivation containers used were plastic pots containing
loamy sand with approximately 3.0% of humus as the substrate. The
seeds of the test plants were sown separately for each species.

10

For the pre-emergence treatment, directly after sowing, the
active compounds, which had been suspended or emulsified in
water, were applied by means of finely distributing nozzles. The
containers were irrigated gently to promote germination and

15 growth and subsequently covered with transparent plastic hoods
until the plants had rooted. This cover caused uniform
germination of the test plants, unless this was adversely
affected by the active compounds.

20 For the post-emergence treatment, the test plants were first
grown to a height of from 3 to 15 cm, depending on the plant
habit, and only then treated with the active compounds which had
been suspended or emulsified in water. The test plants were for
this purpose either sown directly and grown in the same
25 containers, or they were first grown separately as seedlings and
transplanted into the test containers a few days prior to
treatment. The application rate for the post-emergence treatment
was 0.095, 0.5 or 1.91 kg of a.s. (active substance).

30 Depending on the species, the plants were kept at 10-25°C or
20-35°C. The test period extended over from 2 to 4 weeks. During
this time, the plants were tended, and their response to the
individual treatments was evaluated.

35 Evaluation was carried out using a scale from 0 to 100. 100 means
no emergence of the plants, or complete destruction of at least
the aerial parts and 0 means no damage, or normal course of
growth.

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The plants used in the greenhouse experiments were of the following species:

5	Scientific name	Common name
	Abutilon theophrasti	velvetleaf
	Setaria italica	foxtail millet
	Sinapis alba	white mustard
	Chenopodium album	common lambsquarters
10	Setaria faberia	giant foxtail
	Galium aperine	catchweed
	Polygonum persicaria	ladysthumb

15 Compound I-19 provides very good control of Abutilon theophrasti and Setaria italica when applied by the post-emergence method at application rates of 0.5 kg of a.s./ha.

20 Compound I-24 provides very good control of Abutilon theophrasti and Sinapis alba when applied by the post-emergence method at application rates of 0.5 kg of a.s./ha.

25 Compound I-25 provides very good control of Abutilon theophrasti, Setaria italica and Sinapis alba when applied by the post-emergence method at application rates of 0.5 kg of a.s./ha.

Compound I-32 provides very good control of Setaria italica and Sinapis alba when applied by the post emergence method at application rates of 0.095 kg of a.s./ha.

30 Compound I-49 provides very good control of Abutilon theophrasti, Setaria italica and Sinapis alba when applied by the post-emergence method at application rates of 1.91 kg of a.s./ha.

35 Compound I-49 provides very good control of Abutilon theophrasti, Setaria italica and Sinapis alba when applied by the post-emergence method at application rates of 3.0 kg of a.s./ha.

40 Compound I-51 provides very good control of Abutilon theophrasti and Chenopodium album when applied by the post-emergence method at application rates of 1.0 kg of a.s./ha.

45 Compound I-53 provides very good control of Abutilon theophrasti, Setaria italica and Sinapis alba when applied by the post-emergence method at application rates of 0.5 kg of a.s./ha.

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Compound II-91 provides very good control of *Abutilon theophrasti* and *Sinapis alba* when applied by the post-emergence method at application rates of 2.0 kg of a.s./ha.

- 5 Compound II-87 provides very good control of *Setaria faberia* and *Chenopodium album* when applied by the post-emergence method at application rates of 1.0 kg of a.s./ha.

- 10 Compound II-94 provides very good control of *Abutilon theophrasti*, *Setaria italica* and *Sinapis alba* when applied by the post-emergence method at application rates of 3.0 kg of a.s./ha.

- 15 Compound II-111 provides very good control of *Abutilon theophrasti*, *Setaria italica* and *Sinapis alba* when applied by the post-emergence method at application rates of 1.0 kg of a.s./ha.

- 20 Compound II-112 provides very good control of *Abutilon theophrasti*, *Setaria italica* and *Sinapis alba* when applied by the post-emergence method at application rates of 1.0 kg of a.s./ha.

- 25 Compound II-15 provides very good control of *Abutilon theophrasti*, *Setaria italica* and *Sinapis alba* when applied by the post-emergence method at application rates of 0.5 kg of a.s./ha.

- Compound II-10 provides very good control of *Chenopodium album*, *Galium aparine* and *Polygonum persicaria* when applied by the post-emergence method at application rates of 1.0 kg of a.s./ha.

- 30 Compound II-7 provides very good control of *Abutilon theophrasti* and *Chenopodium album* when applied by the post-emergence method at application rates of 1.0 kg of a.s./ha.

- 35 Use examples for growth-regulating action

The growth-regulating action of the phenylalanine derivatives of the formula I was demonstrated by greenhouse experiments:

- 40 The cultivation containers used were plastic pots containing loamy sand with approximately 3.0% of humus as the substrate. The seeds of the test plants were sown separately for each species.

- 45 For the pre-emergence treatment, directly after sowing, the active compounds, which had been suspended or emulsified in water, were applied by means of finely distributing nozzles. The containers were irrigated gently to promote germination and growth and subsequently covered with transparent plastic hoods

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until the plants had rooted. This cover causes uniform germination of the test plants, unless this was adversely affected by the active compounds.

- 5 For the post-emergence treatment, the test plants were first grown to a height of from 3 to 15 cm, depending on the plant habit, and then treated with the active compounds which had been suspended or emulsified in water. The test plants were for this purpose either sown directly and grown in the same containers, or
- 10 they were first grown separately as seedlings and transplanted into the test containers a few days prior to treatment. The application rate for the post-emergence treatment was 0.5 kg of a.s./ha.
- 15 Depending on the species, the plants were kept at 10-25°C or 20-35°C. The test period extended over from 2 to 4 weeks. During this time, the plants were tended, and their response to the individual treatments was evaluated.
- 20 At the end of the experiment, the observed growth-regulating action was recorded by measuring the height of growth. The measured values obtained in this manner were compared to the height of growth of untreated plants.
- 25 Compound II-92, when applied post-emergence at a rate of 500 g/ha, had a significant impact on the longitudinal growth of Zea mays L. 14 days after application (see Tab. III)

30	Compound	Height in cm	Plant
	II-92	31-33	Zea mays L.
	Untreated	40-42	Zea mays L.

Table III

35

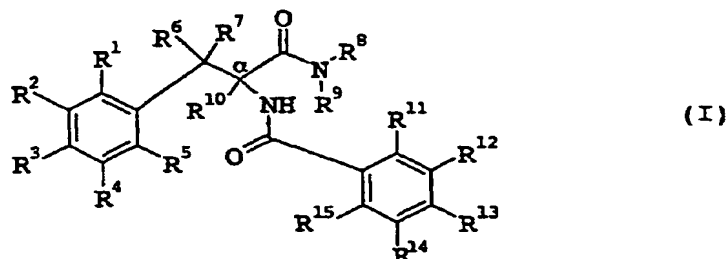
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We claim:

1. A phenylalanine derivative of the formula I



in which

R¹, R², R⁴, R⁵, R¹³ and R¹⁵ independently of one another are hydrogen, halogen, hydroxyl, mercapto, nitro, cyano, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl, C₂-C₆-haloalkynyl, C₁-C₆-haloalkoxy, C₃-C₆-haloalkenyloxy, C₃-C₆-haloalkynyloxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₃-C₆-haloalkynylthio, C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₃-C₆-haloalkynylsulfinyl, C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl, C₃-C₆-haloalkynylsulfonyl, formyl, C₁-C₆-alkylcarbonyloxy, C₁-C₆-alkoxy-C₁-C₄-alkyl, C₃-C₆-alkenyloxy-C₁-C₄-alkyl, C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl, C₃-C₆-alkenylthio-C₁-C₄-alkyl, C₃-C₄-alkynylthio-C₁-C₄-alkyl, C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl, C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl, C₁-C₆-alkoxycarbonyl-C₁-C₄-alkyl, C₁-C₆-alkoxy-C₁-C₄-alkoxy, C₃-C₆-alkenyloxy-C₁-C₄-alkoxy, C₃-C₄-alkynyloxy-C₁-C₄-alkoxy, C₁-C₆-alkylthio-C₁-C₄-alkoxy, C₃-C₆-alkenylthio-C₁-C₄-alkoxy, C₃-C₆-alkynylthio-C₁-C₄-alkoxy, C₁-C₆-alkylcarbonyl-C₁-C₄-alkoxy, C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkoxy, C₁-C₆-alkoxycarbonyl-C₁-C₄-alkoxy or CO-R¹⁶;

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- 5 R³ is hydrogen, halogen, mercapto, C₁-C₆-alkyl,
C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkylthio,
C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl,
C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl,
C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl,
C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl,
C₂-C₆-haloalkynyl, C₁-C₆-haloalkylthio,
C₃-C₆-haloalkenylthio, C₃-C₆-haloalkynylthio,
C₁-C₆-haloalkylsulfinyl, C₃-C₆-halo-alkenylsulfinyl,
10 C₃-C₆-haloalkynylsulfinyl, C₁-C₆-haloalkylsulfonyl,
C₃-C₆-haloalkenylsulfonyl, C₃-C₆-haloalkynylsulfonyl,
C₁-C₆-alkoxy-C₁-C₄-alkyl, C₃-C₆-alkenyloxy-C₁-C₄-alkyl,
C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl,
C₃-C₆-alkenylthio-C₁-C₄-alkyl,
15 C₃-C₆-alkynylthio-C₁-C₄-alkyl,
C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl,
C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl,
C₁-C₆-alkyloxy carbonyl-C₁-C₄-alkyl or CO-R¹⁶;
- 20 R⁶ is hydrogen, C₁-C₆-alkyl, C₂-C₆-alkenyl or C₂-C₆-alkynyl;
- 25 R⁷ is hydrogen, halogen, C₁-C₆-alkyl, C₂-C₆-alkenyl,
C₂-C₆-alkynyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl or
C₂-C₆-haloalkynyl;
- 30 R⁸ is methyl, ethyl, C₁-C₆-alkoxy or hydroxyl;
- 35 R⁹ is hydrogen or C₁-C₆-alkyl;
- 40 R¹⁰ is hydrogen, C₁-C₆-alkyl, C₁-C₆-alkoxycarbonyl or
C₁-C₆-haloalkoxycarbonyl;
- 45 R¹¹ is halogen, mercapto, nitro, cyano, C₁-C₆-alkyl,
C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkoxy,
C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-alkylthio,
C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl,
C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl,
C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl,
C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₂-C₆-haloalkenyl,
C₂-C₆-haloalkynyl, C₁-C₆-haloalkoxy, C₃-C₆-haloalkenyloxy,
C₃-C₆-haloalkynyloxy, C₁-C₆-haloalkylthio,
C₃-C₆-haloalkenylthio, C₃-C₆-haloalkynylthio,
C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl,
C₃-C₆-haloalkynylsulfinyl, C₁-C₆-haloalkylsulfonyl,
C₃-C₆-haloalkenylsulfonyl, C₃-C₆-haloalkynylsulfonyl,
formyl, C₁-C₆-alkylcarbonyloxy,
C₁-C₆-alkoxy-C₁-C₄-alkyl, C₂-C₆-alkenyloxy-C₁-C₄-alkyl,

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- 5 C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl,
C₂-C₆-alkenylthio-C₁-C₄-alkyl,
C₃-C₄-alkynylthio-C₁-C₄-alkyl,
C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl,
C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl,
C₁-C₆-alkyloxy carbonyl-C₁-C₄-alkyl,
C₁-C₆-alkoxy-C₁-C₄-alkoxy, C₃-C₆-alkenyloxy-C₁-C₄-alkoxy,
C₃-C₄-alkynyloxy-C₁-C₄-alkoxy,
C₁-C₆-alkylthio-C₁-C₄-alkoxy,
10 C₃-C₆-alkenylthio-C₁-C₄-alkoxy,
C₃-C₆-alkynylthio-C₁-C₄-alkoxy,
C₁-C₆-alkylcarbonyl-C₁-C₄-alkoxy,
C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkoxy,
C₁-C₆-alkyloxy carbonyl-C₁-C₄-alkoxy or CO-R¹⁶;
15 R¹² and R¹⁴ independently of one another are hydrogen,
halogen, hydroxyl, mercapto, cyano, C₁-C₆-alkyl,
C₂-C₆-alkenyl, C₂-C₆-alkynyl, C₁-C₆-alkoxy,
C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₆-alkylthio,
20 C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl,
C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl,
C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl,
C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₃-C₆-haloalkenyl,
C₂-C₆-haloalkynyl, C₁-C₆-haloalkoxy, C₃-C₆-haloalkenyloxy,
25 C₃-C₆-haloalkynyloxy, C₁-C₆-haloalkylthio,
C₂-C₆-haloalkenylthio, C₃-C₆-haloalkynylthio,
C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl,
C₃-C₆-haloalkynylsulfinyl, C₁-C₆-haloalkylsulfonyl,
C₃-C₆-haloalkenylsulfonyl, C₃-C₆-haloalkynylsulfonyl,
30 formyl, C₁-C₆-alkylcarbonyloxy,
C₁-C₆-alkoxy-C₁-C₄-alkyl, C₃-C₆-alkenyloxy-C₁-C₄-alkyl,
C₃-C₄-alkynyloxy-C₁-C₄-alkyl, C₁-C₆-alkylthio-C₁-C₄-alkyl,
C₃-C₆-alkenylthio-C₁-C₄-alkyl,
C₃-C₄-alkynylthio-C₁-C₄-alkyl,
35 C₁-C₆-alkylcarbonyl-C₁-C₄-alkyl,
C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkyl,
C₁-C₆-alkyloxy carbonyl-C₁-C₄-alkyl,
C₁-C₆-alkoxy-C₁-C₄-alkoxy, C₃-C₆-alkenyloxy-C₁-C₄-alkoxy,
C₃-C₄-alkynyloxy-C₁-C₄-alkoxy,
40 C₁-C₆-alkylthio-C₁-C₄-alkoxy,
C₃-C₆-alkenylthio-C₁-C₄-alkoxy,
C₃-C₆-alkynylthio-C₁-C₄-alkoxy,
C₁-C₆-alkylcarbonyl-C₁-C₄-alkoxy,
C₁-C₆-alkylcarbonyloxy-C₁-C₄-alkoxy,
45 C₁-C₆-alkyloxy carbonyl-C₁-C₄-alkoxy or CO-R¹⁶; and

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- 5 R^{16} is hydrogen, hydroxyl, C_1 - C_6 -alkyl, C_2 - C_6 -alkenyl, C_2 - C_6 -alkynyl, C_1 - C_6 -haloalkyl, C_2 - C_6 -haloalkenyl, C_2 - C_6 -haloalkynyl, C_1 - C_6 -alkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_6 -haloalkoxy, C_1 - C_6 -alkylamino or di(C_1 - C_6 -alkyl)amino;
- or
- 10 R^7 together with R^{10} forms a C_3 - C_4 -alkylene or -alkenylene chain, where the C_3 - C_4 -alkylene or -alkenylene chain may carry 1-3 substituents from the group consisting of halogen, nitro or cyano and/or one carbon atom of the C_3 - C_4 -alkylene chain may be replaced by a heteroatom selected from the group consisting of oxygen, sulfur and
- 15 nitrogen and/or by a carbonyl group.
2. A phenylalanine derivative of the formula I as claimed in claim 1, in which
- 20 R^1 is hydrogen, halogen, nitro, cyano, C_1 - C_6 -alkyl, C_2 - C_6 -alkenyl, C_2 - C_6 -alkynyl, C_1 - C_6 -alkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_6 -alkylthio, C_3 - C_6 -alkenylthio, C_3 - C_6 -alkynylthio, C_1 - C_6 -alkylsulfinyl, C_3 - C_6 -alkenylsulfinyl, C_3 - C_6 -alkynylsulfinyl,
- 25 C_1 - C_6 -alkylsulfonyl, C_3 - C_6 -alkenylsulfonyl, C_3 - C_6 -alkynylsulfonyl, C_1 - C_6 -haloalkyl, C_1 - C_6 -haloalkoxy, C_3 - C_6 -haloalkenyloxy, C_1 - C_6 -haloalkylthio, C_3 - C_6 -haloalkenylthio, C_1 - C_6 -haloalkylsulfinyl, C_3 - C_6 -haloalkenylsulfinyl, C_1 - C_6 -haloalkylsulfonyl or
- 30 C_3 - C_6 -haloalkenylsulfonyl;
- 35 R^2 is hydrogen, halogen, nitro, cyano, C_1 - C_6 -alkyl, C_2 - C_6 -alkynyl, C_1 - C_6 -alkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_6 -haloalkyl, C_1 - C_6 -haloalkoxy, C_3 - C_6 -haloalkenyloxy or C_3 - C_6 -haloalkynyloxy;
- 40 R^3 is hydrogen, halogen, C_1 - C_6 -alkyl or C_1 - C_6 -haloalkyl;
- 45 R^4 is hydrogen, halogen, nitro, cyano, C_1 - C_6 -alkyl, C_1 - C_6 -alkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_6 -haloalkyl or C_1 - C_6 -haloalkoxy;
- 50 R^5 is hydrogen, halogen, nitro, cyano, C_1 - C_6 -alkyl, C_2 - C_6 -alkenyl, C_2 - C_6 -alkynyl, C_1 - C_6 -alkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_6 -haloalkyl, C_1 - C_6 -haloalkoxy or C_3 - C_6 -haloalkenyloxy; and

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- R⁶ is hydrogen or C₁-C₆-alkyl;
- R⁷ is hydrogen, halogen, C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl or C₁-C₆-haloalkyl;
- 5 R⁸ is methyl, ethyl, hydroxyl or methoxy;
- R⁹ is hydrogen or methyl;
- 10 R¹⁰ is hydrogen, C₁-C₆-alkyl, C₁-C₆-alkoxycarbonyl or C₁-C₄-haloalkoxycarbonyl;
- 15 R¹¹ is halogen, nitro, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl or CO-R¹⁶;
- 20 R¹³ is hydrogen, halogen, nitro, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl or CO-R¹⁶;
- 25 R¹² and R¹⁴ independently of one another are hydrogen, halogen, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₃-C₆-alkenylthio, C₃-C₆-alkynylthio, C₁-C₆-alkylsulfinyl, C₃-C₆-alkenylsulfinyl, C₃-C₆-alkynylsulfinyl, C₁-C₆-alkylsulfonyl, C₃-C₆-alkenylsulfonyl, C₃-C₆-alkynylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio, C₃-C₆-haloalkenylthio, C₁-C₆-haloalkylsulfinyl, C₃-C₆-haloalkenylsulfinyl, C₁-C₆-haloalkylsulfonyl, C₃-C₆-haloalkenylsulfonyl or CO-R¹⁶;
- 30 R¹⁵ is hydrogen, halogen, C₁-C₆-alkyl or C₁-C₆-haloalkyl;
- 35
- 40
- 45

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R¹⁶ is hydrogen, hydroxyl, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₁-C₆-alkoxy, C₁-C₆-haloalkoxy, C₁-C₆-alkylamino or di(C₁-C₆-alkyl)amino;

5 and its agriculturally useful salts.

3. A phenylalanine derivative of the formula I as claimed in claim 1 or 2 in which

10 R¹ is hydrogen, halogen, cyano, C₁-C₆-alkyl, C₁-C₆-alkylthio, C₁-C₆-alkylsulfinyl or C₁-C₆-alkylsulfonyl;

15 R² is hydrogen, halogen, cyano, C₁-C₆-haloalkyl or C₁-C₆-alkyl;

R³ is hydrogen, C₁-C₆-alkyl or halogen;

R⁴ is hydrogen, halogen, C₁-C₆-alkyl or C₁-C₆-haloalkyl;

20 R⁵ is hydrogen, halogen, C₁-C₆-alkyl or C₁-C₆-haloalkyl;

R⁶ is hydrogen or C₁-C₆-alkyl;

25 R⁷ is hydrogen, C₁-C₆-alkyl, C₂-C₆-alkenyl or C₂-C₆-alkynyl;

R⁸ is methyl, hydroxyl or methoxy;

R⁹ is hydrogen or methyl;

30 R¹⁰ is hydrogen; and

35 R¹¹ is halogen, cyano, C₁-C₆-alkyl, C₁-C₆-alkylthio, C₁-C₆-alkylsulfinyl, C₁-C₆-alkylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy, C₁-C₆-haloalkylthio, C₁-C₆-alkylsulfonyl or C₁-C₆-alkylsulfinyl;

40 R¹², R¹³ and R¹⁴ independently of one another are hydrogen, halogen, cyano, C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylthio, C₁-C₆-alkylsulfinyl, C₁-C₆-alkylsulfonyl, C₁-C₆-haloalkyl, C₁-C₆-haloalkoxy or C₁-C₆-haloalkylthio; and

R¹⁵ is hydrogen.

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4. A phenylalanine derivative of the formula I as claimed in any of claims 1, 2 or 3 in which

5 R^1 , R^2 , R^3 , R^5 in each case independently of one another are hydrogen, fluorine, chlorine, methyl or ethyl;

R^4 , R^6 , R^{10} , R^{14} and R^{15} are hydrogen;

10 R^7 is hydrogen, methyl or ethyl;

R^8 is methoxy, methyl or hydroxyl;

R^9 is hydrogen;
is methyl if R^8 is hydroxyl;

15 R^{11} is fluorine, chlorine, halomethyl such as fluoromethyl, difluoromethyl, trifluoromethyl, halomethoxy, such as fluoromethoxy, difluoromethoxy, trifluoromethoxy, halothioalkyl, such as fluorothiomethyl, difluoro-

20 methyl, trifluoromethyl, methylsulfinyl or methylsulfonyl;

R^{12} is hydrogen, cyano, methyl, fluorine, chlorine, halo-

25 methyl, such as fluoromethyl, difluoromethyl, trifluoromethyl, halomethoxy, such as fluoromethoxy, difluoromethoxy, trifluoromethoxy, halothioalkyl, such as fluorothiomethyl, difluoro-

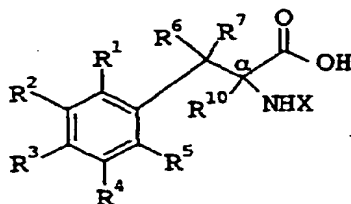
30 R^{13} is hydrogen, fluorine, chlorine.

5. A process for preparing the phenylalanine derivatives of the formula I as claimed in any of claims 1 to 4, which comprises

35

(A) linking a phenylalanine derivative of the formula II

40



(II)

45

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which is protected at the amino function by a protective group X to a support resin;

(B) removing the protective group X by addition of a base,

5

(C) acylating the resulting compounds at the nitrogen

and

10 (D) cleaving the compounds acylated at the nitrogen from the solid support by addition of an acid, followed by addition of a condensing agent with an amine IX

$$R^8-NH-R^9$$

(IX)

15

to give the phenylalanine derivatives I as claimed in any of claims 1 to 3.

20 6. A process for preparing the phenylalanine derivatives of the formula I as claimed in any of claims 1 to 4 in which $R^9 =$ hydrogen, which comprises

(A) reacting a polymer resin X

25

$$Pol-CHO \quad (X)$$

with an amine XI

30

$$H^2NR^8 \quad (XI)$$

in the presence of a reducing agent;

(B) reacting the aminated resin XII

35

$$Pol-CH_2-NHR^8 \quad (XII)$$

obtained in step A with a phenylalanine derivative of the formula II as set forth in claim 4;

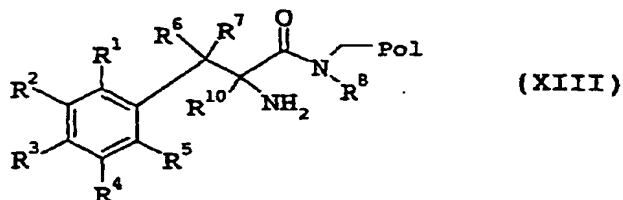
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(C) removing the protective group X by addition of a base;

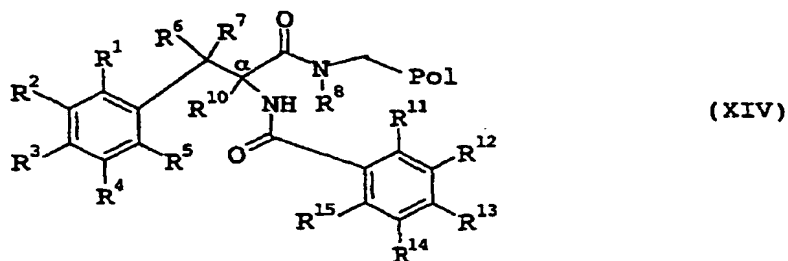
(D) and acylating the resulting compounds XIII

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to give the compounds XIV



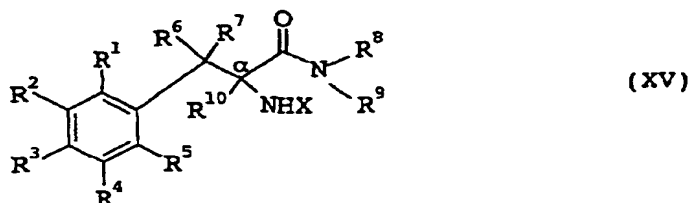
which are subsequently, by addition of an acid, cleaved from the solid support, giving the compounds I.

7. A process for preparing the phenylalanine derivatives of the formula I as claimed in any of claims 1 to 4, which comprises

(A) reacting a phenylalanine derivative of the formula II as set forth in claim 4, which is protected at the amino function by a protective group X, with an amine IX



in an inert aprotic dipolar organic solvent to give the compounds XV



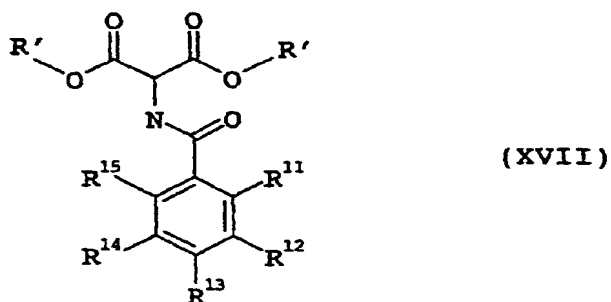
(B) removing the protective group X, and

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(C) acylating the compounds obtained in step B to give the compounds I.

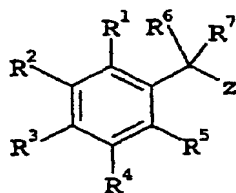
8. A process for preparing the phenylalanine derivatives of the formula I in which R^9 = hydrogen as claimed in any of claims 1 to 4, which comprises

(A) reacting an aminomalonic acid ester derivative XVII



in which R' is a low-molecular-weight organic radical

with a benzyl derivative XVIII



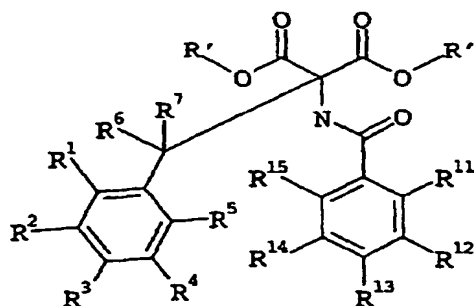
to give the diesters XIX

35

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XIX

(B) decarboxylating and hydrolyzing the diester XIX, followed by reaction with an amine IX

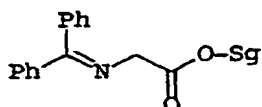
HNR⁸R⁹

(IX)

in an inert aprotic dipolar organic solvent using a condensing agent, to give the compounds I.

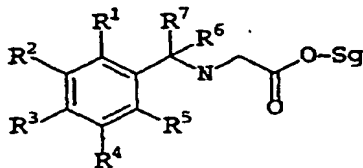
9. A process for preparing the phenylalanine derivatives of the formula I as claimed in any of claims 1 to 4, which comprises

(A) reacting the benzyl derivative XVIII with an alkylating agent XXI



XXI

to give the compounds XXII



XXII

(B) and acylating the resulting compounds at the nitrogen

and

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(C) reacting the nitrogen-acylated compounds by addition of a condensing agent with an amine IX



(IX)

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to give the phenylalanine derivatives I as claimed in any of claims 1 to 3.

- 10 10. A composition which comprises at least one phenylalanine derivative of the formula I or an agriculturally useful salt of a phenylalanine derivative of the formula I as claimed in any of claims 1 to 4 and customary auxiliaries.
- 15 11. A composition suitable for controlling undesirable vegetation, which composition comprises a solid or liquid carrier and at least one phenylalanine derivative of the formula I or an agriculturally useful salt of a phenylalanine derivative of the formula I as claimed in any of claims 1
20 to 4.
12. The use of the compounds I as claimed in any of claims 1 to 4 for preparing a composition suitable for controlling undesirable vegetation.
- 25 13. A method for controlling undesirable vegetation, which comprises allowing a herbicidally effective amount of at least one phenylalanine derivative of the formula I or an agriculturally useful salt of a phenylalanine derivative of
30 the formula I as claimed in any of claims 1 to 4 to act on plants, their habitat and/or on seed.
14. A composition for regulating plant growth, comprising a growth-regulating amount of at least one substituted
35 phenylalanine derivative of the formula I or an agriculturally useful salt of I as claimed in any of claims 1 to 4 and at least one inert liquid and/or solid carrier and, if desired, at least one surfactant.
- 40 15. A process for preparing compositions for regulating plant growth, which comprises mixing a growth-regulating amount of at least one substituted phenylalanine derivative of the formula I or an agriculturally useful salt of I as claimed in any of claims 1 to 4 with at least one inert liquid and/or
45 solid carrier and, if desired, at least one surfactant.

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16. A method for regulating plant growth, which comprises
allowing a growth-regulating amount of at least one
substituted phenylalanine derivative of the formula I or an
agriculturally useful salt of I as claimed in any of claims 1
5 to 4 to act on plants.

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